# pit and quarry

THE BASIC MAGAZINE IN A BASIC INDUSTRY

**DOUBLE-DECKING A BRIDGE**

*SEE PAGE 134*

**JANUARY 1961**

## 1960 · annual review & forecast · 1961

# "EIMCO IS THE ONLY MACHINE THAT WILL DO THE JOB" . . .

## Says Contractor Holloway

That's sub-contractor H. Holloway, who specified this Eimco 105 Excavator, owned by George M. Brewster and Son of Bogota, N. J., prime contractor, for construction of a 900 foot x 17 foot diversion tunnel.
The project is an earth fill, rock faced dam to control the flow of Kettle Creek, Pa. The tunnel diverts Kettle Creek during construction and, upon completion, will be used to control flood waters, along with the dam spillway.
Advancement to date has been over 635 feet.
The Eimco 105 Excavator is used to muck out each round in the tunnel. Two shifts a day each complete two 9 foot rounds of drilling, blasting and mucking.
Two Koehring trucks take the muck out to the dam face, where it is dumped and later distributed to proper thickness.

**THE EIMCO EXCAVATOR LOADS EACH TRUCK IN ONLY 45 SECONDS. THERE IS NO STANDBY MACHINE, FOR THE SUB-CONTRACTOR HAS EXPERIENCED THE DEPENDABILITY OF THIS TRACTOR-EXCAVATOR AND THE MINIMUM DOWN TIME IT REQUIRES.**
No comparative equipment is in use because, as Mr. Holloway states, "Eimco is the only machine that will do the job." Operators are Boyd Martin and Dewey Patterson, whose long experience includes many jobs and hours with an Eimco, with some of the country's leading contractors.
Where the goings roughest, you just can't beat an Eimco! Get all the facts on the complete line of modern Eimco crawler-tractor equipment. **Contact the dealer or branch nearest you or write The Eimco Corporation, P.O. Box 300, Salt Lake City 10, Utah, U.S.A.**

"ADVANCED ENGINEERING AND QUALITY CRAFTSMANSHIP SINCE 1884"

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**TRACTOR LOADER DIVISION**
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*Enter Cover 2 on card, page 183*

GOODYEAR

# NOW THE MOST RUGGED OF ROCK TIRES!

**1 NEW SHREDDED WIRE UNDER-TREAD** gives better resistance to cuts and punctures—dissipates heat—reduces separation (by providing improved adhesion between tread and carcass)—retards cut growth—serves as a "cushioning bridge" between the carcass and the tread. RESULT: a much tougher, more solidly built—longer-lasting tire!

**2 EXTRA-THICK TREAD**—fully 50% thicker than the regulars—means longer tread life. Nonskid tread is up to 71% deeper too. RESULT: outstanding mileage and traction!

**3 NEW HEAT-RESISTANT COMPOUNDS** are also available! They protect against heat build-up. RESULT: Longer life on longer hauls at higher speeds!

**4 EXCLUSIVE 3-T PROCESSED NYLON CORD** is triple-tempered—like steel—by Tension, Temperature and Time. RESULT: bruise-breaks and blowouts are reduced to an all-time low!

# NEW HARD ROCK LUG XTRA TRED

## is now fortified 4 ways!

Artist's conception of Hard Rock Lug Xtra Tred rear tires hauling limestone for cement production in Calaveras County, California.

Give your equipment *and* your profits the super-protection of super-fortified Hard Rock Lug Xtra Tred tires. See your Goodyear dealer—*today!*
Goodyear, Truck Tire Dept., Akron 16, Ohio.

Lots of good things come from

# GOODYEAR

Xtra Tred—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

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# 450 FEET

## OF TRAYLOR KILN EFFICIENCY

Shown above is one of two 12′ x 450′ Traylor rotary kilns designed and built to meet the requirements of the Standard Lime and Cement Company, Martinsburg, West Virginia. Both are wet process kilns driven by dual drives with forged steel riding rings and forged steel supports. These kilns feature the Traylor-designed chain systems and dust return scoops. They are fed by a Traylor slurry feeder.

Write today outlining your kiln requirements and let our engineers make recommendations . . . or write for Bulletin No. 1115.

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# PIT and QUARRY

JANUARY 1961
VOL. 53 No. 7


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Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel, Slag and other nonmetallic minerals.


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***To subscribers: When requesting change of address, kindly send old as well as new address.***

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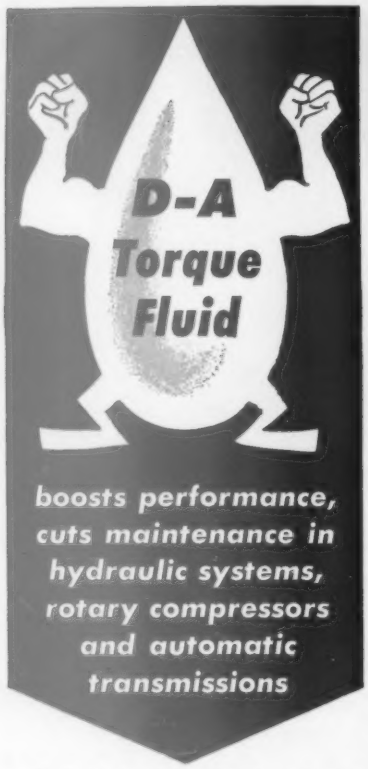


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# PLANNING AND GOOD EQUIPMENT SET A RECORD!

When and if you ride over the 33 miles of 4-lane Interstate 80 from Stuart, west of Des Moines, to Route 71 in Iowa, you might be reminded that the road base constituted one of the greatest aggregate production jobs in the history of road building.

To do the job, E. F. Schildberg Construction Company of Greenfield, Iowa, with highly competent planning and good equipment, delivered a million tons of crushed limestone (minus 1 in.) in 4½ months. For 7½ months the production of the Cedarapids plant was over 1,000 tons per hour. Many days the plant produced more than 12,000 tons.

All of the vast amount of shot limestone to supply the crushers was handled by four Northwest shovels.

Here again Northwests proved their outstanding ability for output in rock. But more than that, they proved their dependability on a highball job where delay would have been critical.

Your Northwest is a *real* Rock Shovel. They get the job done — not just for the day — but for the week, the month — year in, year out. That's what makes money.

*If you want output — if you want to make money, you can bank on Northwest — there is no finer equipment built.*

View of the tremendous plant with pit in background.

**NORTHWEST ENGINEERING COMPANY**
135 South LaSalle Street • Chicago 3, Illinois
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S-80-9-S

3/4 to 3
Cubic Yard Capacity

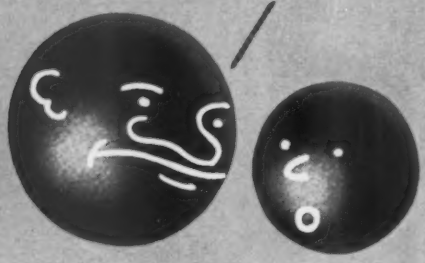
# NORTHWEST

**NORTHWEST EQUIPMENT IS BUILT IN THE FOLLOWING SIZES**

| SHOVELS | CRANES | DRAGLINES |
|---|---|---|
| ¾ Yd. to 2½ Yd. Capacity | 13-Ton to 60-Ton Capacity | ¾ Yd. to 3 Yd. Capacity |

| PULLSHOVELS | TRUCK CRANES |
|---|---|
| ¾ Yd. to 2½ Yd. Capacity | 25-Ton and 35-Ton Capacity |

"It ain't easy to get Coates' approval ...you gotta be tough to the core"



Coates Triple-Forged Carbex Grinding Balls really have to be able to take it . . . and dish it out. Continued checks and calibrations throughout the manufacturing process protect the high standards and assure uniformity . . . made of fine-grained, high-carbon steel . . . Scientifically heat treated to the core, they are hard, to last longer and to grind better; tough to avoid shattering under stress of milling. Production run tests show that job for job and dollar for dollar, Coates out-performs grinding balls costing many times more. Yet, Coates sponsors continuing research to find ways of making even better grinding balls.

Call for Coates Triple-Forged Grinding Balls . . . built with care for better wear.

Write for prices . . . all sizes—½" to 5" carried in stock for immediate shipment.

CB61-1

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**STEEL PRODUCTS COMPANY**

**GREENVILLE, ILLINOIS**

**LARGEST EXCLUSIVE MANUFACTURER OF GRINDING MEDIA**

*Wanted: In 12 days, 40,000 tons of 1" minus*

# Two Diamond Plants Do Job

All belt conveyors on the new model 70 are 30" wide, 5-ply 28 oz. duck, for maximum carrying capacity and minimum spillage.

The model 66 is an "old pro" that consistently exceeds its rated capacity of 100-125 cu. yds. per hour (material passing a 1" screen based on 25% oversize).

**Diamond makes everything for the aggregate producer**

Jaw Crushers • Roll Crushers • Conveyors • Screens and Washers • Feeders and Bins • Portable and Stationary Crushing Plants for Rock and Gravel.

To keep a road repair project ahead of schedule 40,000 tons of 1" minus base fill was needed in a hurry. To get it, the contractor, over a week-end moved two Diamond plants and two shovels across county to a new pit location and lined up 18 trucks of 27 to 44 ton capacity. On Monday morning the plants were grinding out the needed aggregate from material requiring 50% crushing. Despite several spells of rain and three moves in the pit, the contract was filled—profitably.

The Diamond 66 and the new Diamond 70 portable plants did the job. Jaw crushers, 10" x 36" quickly reduced large rock to uniform size. The roll crushers (30" x 20" on the 66 and 32" x 24" on the 70) stepped up output by eliminating reruns. Balanced vibrating screens separated material thoroughly, belt conveyors carried loads quickly and smoothly—a synchronized line-flow system that moved material through the plant without delay . . . no by-passes, no bottlenecks.

Combine the production advantages of these two plants with full portability in the pit or on the road and you can see why this producer accepted a tough rush contract—and made money.

Check with your Diamond distributor for complete information on the Diamond 66 and the new Diamond 70.

**DIAMOND IRON WORKS**
DIVISION
**GOODMAN MANUFACTURING COMPANY**
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DIAMOND



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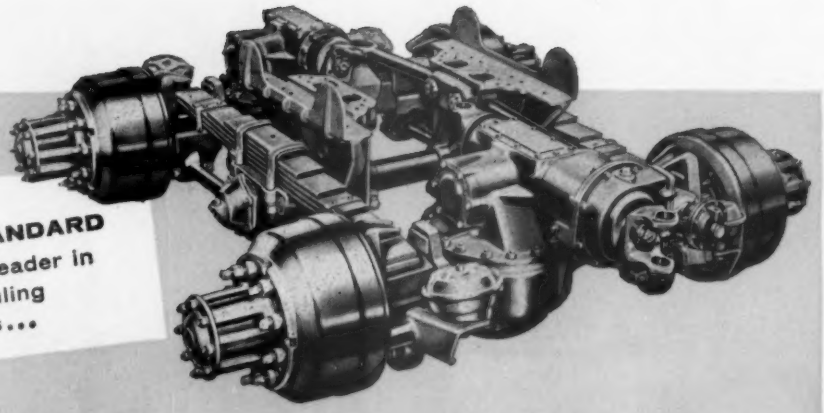


ROCKWELL-STANDARD
Acknowledged Leader in
Rugged Hauling
Operations...

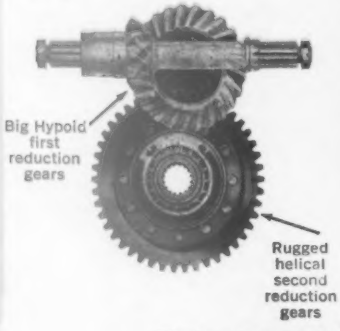
## Here's why Timken-Detroit®

# DOUBLE-REDUCTION TANDEMS LEAD IN TOP PERFORMANCE—LONG LIFE!

Timken-Detroit Heavy-Duty Tandems with Hypoid Helical Double-Reduction Gears are the big favorites for top performance and long life. Here are some of the reasons why:

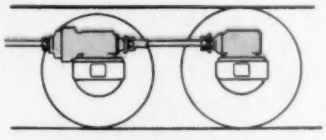
### Rugged Hypoid-Helical Double-Reduction Gearing!

Balanced gearing—with two full-sized gear sets working in series to take an equal share of the load—provides a stronger power train with balanced gear set loadings and the widest range of ratios.



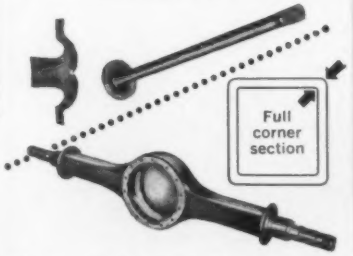

### Driver Controlled Interaxle Differential!

Allows differential action between the axles to compensate for worn or mismatched tires. Both axles do equal amounts of work . . . can be disengaged at any speed, giving positive through drive when better traction is needed. *Straight-Line Through Drive* eliminates prop shaft angularity . . . increases bearing and gear life, reduces maintenance.




### "Torsion-Flow" Axle Shafts and Hot-Forged Housings!

More splines, Torsion-Flow forging, and patented heat-treating processes make Rockwell-Standard shafts the toughest in the industry. Housings are hot-forged from high carbon steel, and are rectangular shaped with full strength corners for greatest strength with minimum weight.




**Timken-Detroit Double-Reduction Tandems come in a wide range of capacities—6 models from 34,000 to 65,000 pounds.**

*Another Product of...*

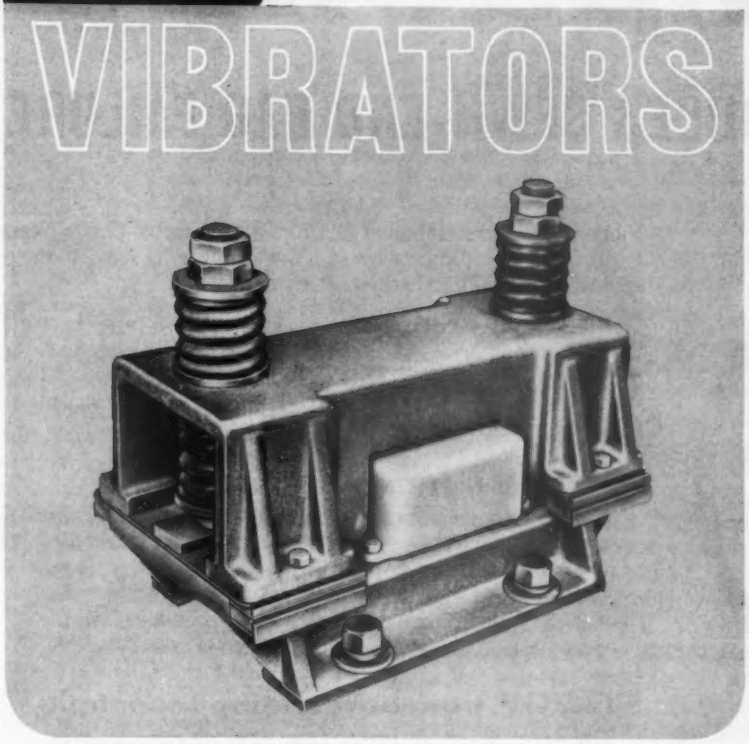
**ROCKWELL-STANDARD CORPORATION**

ROCKWELL R STANDARD ®

Transmission and Axle Division, Detroit 32, Michigan

KEEP BULK MATERIALS FLOWING FREELY

# SYNTRON ELECTRIC VIBRATORS



## ASSURE STEADY MATERIALS FLOW FROM BINS, HOPPERS, CHUTES

Syntron builds an Electromagnetic Bin Vibrator unit to meet almost every requirement. Prevents most types of bulk materials from arching or plugging in bins, hoppers, and chutes.

The Electromagnetic drive unit produces 3600 instantly controllable vibrations per minute, providing a steady materials flow to processing equipment.

Every Syntron Electromagnetic Bin Vibrator is rugged and durable. The absence of mechanical moving parts assures long, trouble-free service with very little maintenance.

Keep bulk materials flowing efficiently and economically.

Write for a Syntron Catalog and the name of the representative nearest you.

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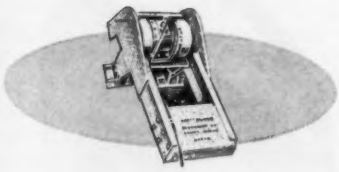
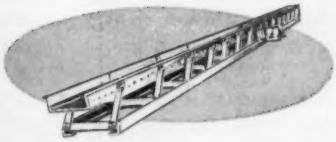
*Other SYNTRON equipment of proven dependable quality*

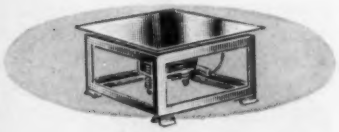


*Car Shakers*

*Rectifier Power Units*



*Mechanical Vibrating Conveyors*



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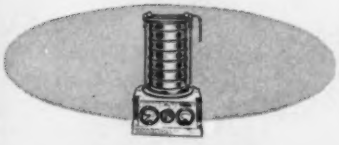

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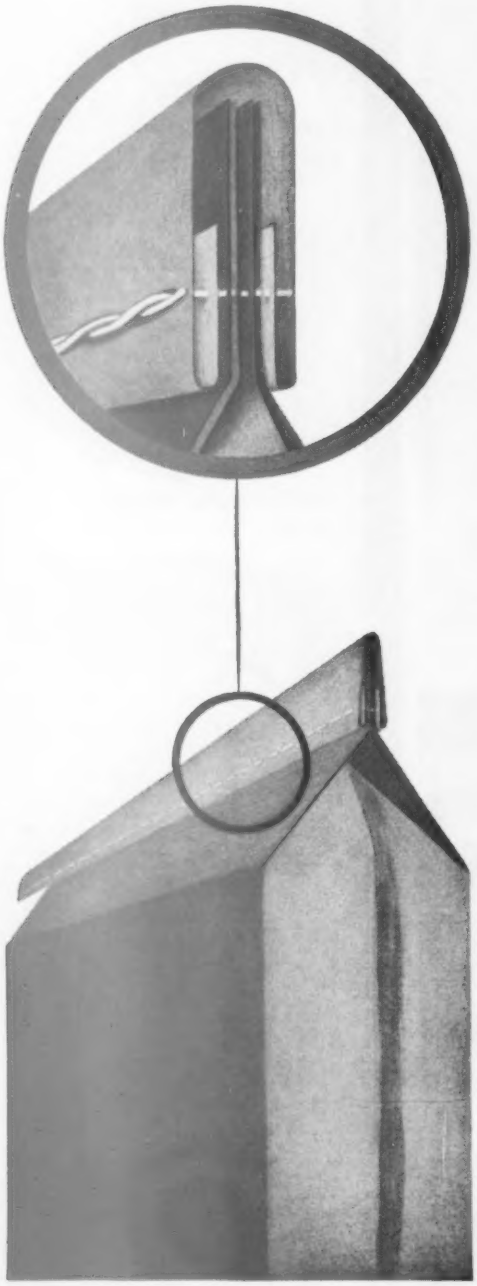
ANOTHER TECHNICAL ADVANCE FROM WEST VIRGINIA

# NEW ImpacTAPE™

## DRASTICALLY REDUCES SEWN-END BAG FAILURE



Pioneer in the development of Clupak* extensible paper, West Virginia now leads the way to a far stronger, tighter, money-saving sewn multiwall through "ImpacTape."

ImpacTape is a revolutionary new type of sewn tape closure** that adds four layers of tape to the sewn end instead of the conventional two. This provides *49% greater toughness* than standard sewn 70-lb. tape closures plus a new "cushioning" against impact shock.

### PROOF from actual field trial

A leading cement company had an unusually high sewn valve breakage rate of 1%. They packed a trial shipment of bags, using West Virginia's new ImpacTape. Average breakage rate went down to .3%—a reduction of 70%. Dollar savings from reduced breakage will far exceed the small upcharge for the new closure.

### PROOF from new testing technique

The development of ImpacTape was hastened by West Virginia's successful adoption of the Impact Resistance Tester to measure sewn end toughness under conditions of sudden shock. It represents the only sewn closure test devised thus far which bears a predictable correlation to drop tests and actual field performance.

Studies indicate that 70% of sewn bag breakage ordinarily is at the sewn closure, even on Clupak paper bags, because the sewn closure is the weakest point in the bag. Often this breakage was incorrectly blamed on the paper. Now stronger ImpacTape opens the door to profits from the greater toughness and possible basis weight reductions which Clupak paper is delivering to thousands of users. *This is realistic research achievement —aimed straight at reducing your total packaging costs.*

For a brochure giving detailed information, write and tell us whether you use sewn open mouth or sewn valve bags. Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Ave., New York 17, N. Y.

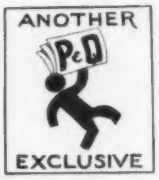
**Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications.*

***Patent Pending.*

**West Virginia Pulp and Paper**

# Washington News Letter

By S. HERBERT UNTERBERGER




BY this time there is almost unanimous agreement, not only in Washington but elsewhere as well, that economic conditions are likely to get worse before they get better. It appears entirely possible that the inauguration of the new President will coincide with a period showing one of the highest unemployment rates in the last decade.

In recent years, there has been a general consensus that unemployment has reached "substantial" proportions when 6 percent of the labor force is out of work. On a seasonally adjusted basis, this figure was passed in mid-October, and the trend does not appear to have reversed itself since that time.

Indeed, the reports coming out of Washington suggest the likelihood of further increase of unemployment. Even before the Presidential election, private surveys became available which indicated a significant decline in spending on capital goods, a key indicator of basic economic trends.

This indication has now been made official by the Department of Commerce-Securities and Exchange Commission report, which shows a steady decline from the rate of investment which reached a peak in the spring of 1960 and has been declining ever since. The report indicates that the decline is virtually certain to continue into the first quarter of 1961 and probably beyond that.

To be sure, these government agencies still expect that 1961 will show a higher dollar figure of capital investment than 1960 but not nearly as much higher as was originally expected. While it is not being said very loudly or very openly, even this will depend on a reversal of the sales and employment trend and, of course, it could not become an actuality until the returns from the latter part of the year are in.

While there is no doubt that the new administration will attempt to move rapidly with measures designed to reverse the trend, instantaneous results can not be expected. However, the force of economic events is beginning to change the priority for new legislation. It was previously expected that the amendments to the Wage and Hour law increasing the minimum wage and extending coverage would be at the top of the list.

This priority is beginning to yield to legislation designed to help depressed areas. Further pressure in this direction was generated by the addition of nine more areas to the list of those regarded as having serious unemployment. The total number of such areas now stands at 51. At the worst point of the 1958 recession, in November, the figure was as high as 83.

Back at least as far as Franklin D. Roosevelt, all the presidents attacked rising unemployment and business recessions principally by reducing interest rates and increasing government spending. The former method may no longer be available to the new president because of the possibility that a further reduction in interest rates in the United States is likely to intensify the flight of foreign capital from the United States and the problems associated with an unfavorable balance of trade and the relatively rapid gold outflow.

Before, during, and particularly after World War II large quantities of foreign capital, which could escape from its country of origin, came into the United States because of its relative safety when invested here. While our interest rates were, even then, generally lower than those prevailing elsewhere, the stability and strength of our economy made it desirable, nevertheless, to invest here.

This situation still exists, but to a lesser degree. The economies of other countries have achieved a degree of strength and stability and, in addition, higher interest rates generally prevail in these countries. Much foreign capital and large amounts of domestic capital are finding attractive investment opportunities abroad. This was not a serious threat until we began to import substantially more than we were exporting. Now the trend has become a problem. A further decline in domestic interest rates would intensify it by making foreign investment relatively more attractive.

This leaves the expansion of government spending as the principal weapon. Even if the economic brains enlisted by the new administration come up with bright new ideas, it will take a long time before they are worked out and accepted, particularly by the Congress.

Although it was done very quietly, the Eisenhower administration had already begun to expand public construction, which has been rising ever since the spring of 1960. Most of this expansion has been on highway construction. Nevertheless, the funds spent on highway construction in 1960 fell below the 1959 level. If the features of the program, particularly of the Interstate System, remain unchanged, no substantial rise can be expected until 1962. However, this program was stepped up once before, in 1958 and 1959, in response to the need for more jobs, and the same action will probably be taken in 1961.

In the next few months, while the new Administration is trying to solve the problem of economic recession, we can look forward to a good deal of recrimination. Real progress will probably not be made until after the middle of the year.

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# Labor Developments

## First Important Decision Under Landrum-Griffin Act

By S. HERBERT UNTERBERGER

S. Herbert Unterberger and Company
Economists-Consultants on Labor and Industrial Relations
Washington, D.C.-Philadelphia, Pa.

ONE of the objectives of the Landrum-Griffin Act—the labor law passed by the last Congress—was to provide some protection for employers against a permanent picket line set by a union trying unsuccessfully to organize the workers.

For the first time, a labor law included a provision that, if picketing which has as one of its objects forcing an employer to recognize or bargain with a labor organization has continued for 30 days and no petition for a representation election has been filed, as soon as such a petition is filed, the National Labor Relations Board shall forthwith hold an election and certify the results. Thus, after 30 days of picketing, an employer could get an election held promptly. If the union lost it, it would have to withdraw its pickets.

There was great concern, however, that the benefits which this provision sought to deliver might be lost by the proviso which was added to it, namely, the requirement that this expedited procedure would not be available to prohibit picketing or other publicity for the purpose of truthfully advising the public, including consumers, that an employer does not employ members of, or have a contract with, a labor organization, unless the effect of such picketing would induce any individual employed by any other person to stop picking up, delivering, or transporting any of the employer's goods or refuse to perform any services for him.

Thus, the legislation drew a very narrow line between purely informational picketing, which is not subject to the expedited procedure, and organizational picketing, which is. Indeed, if the purpose of the picketing is purely informational, the permanent picket line could continue without federal interference.

Because of its relative ambiguity, it is not surprising that this provision became one of the earliest to be tested in the courts and the first on which a broad interpretation was provided by the Federal Court of Appeals in San Francisco.

In this case, the union notified the employer that:

1. It intended to inform the public that the store did not operate under fair union conditions.
2. It did not claim, at the time, to represent a majority of the store's employees.
3. It was not the union's intention to secure a union contract until and unless a majority of the employees of the store voluntarily designated the union as their collective bargaining agent.

The union thereupon established picket lines which carried placards informing the public that the store did not operate under union conditions and included the line, "Please do not patronize." The pickets distributed leaflets to passersby which stated, among other things, "The employees of this store do not enjoy union wages, hours, and other working conditions," and ". . . your patronage breaks down . . . fair wages and working conditions . . . and threatens the jobs of our members in those stores."

Shortly thereafter the employer charged the union with an unfair labor practice on the ground that the picketing and advertising had as an object forcing the employer to recognize and bargain with the union. It requested an immediate representation election.

The regional director of the National Labor Relations Board investigated the charges and concluded that the picketing was for the condemned objective. He ordered an election. The union tried to postpone the election by demanding a hearing. This was denied, whereupon, a suit to enjoin the regional director from holding the election was begun in the Federal District Court. The court denied the request.

It was this denial which was appealed to the Federal Circuit Court, which upheld the District Court's action. In doing so, the Circuit Court pointed out that the law Congress passed included the requirement that under the prescribed condition an election would be held "forthwith." This explicitly prohibited the use of the normal time-consuming procedures, including hearings. Thus, the use of hearings would be clearly contrary to the Congressional intent.

The court also clarified to some extent the range of informational picketing by pointing out that the same picketing may have many purposes. Although it may be informational, the National Labor Relations Board may, on the basis of the evidence, conclude that one of its objects may also be organizational. In this case the expedited procedure is not only appropriate but, if requested, it must be used.

One final bit of information may be of interest. Even under the expedited procedure, the election was not held until 10 weeks after the picketing began and about 8 weeks after the employer requested. Why the union wanted to postpone it became clearly evident at that time. The employees voted against such representation unanimously.

# HERE'S HELP FOR PROGRESSIVE PRODUCERS

It's the authoritative *Handbook*—newly revised—used and prized by progressive aggregate producers everywhere. Complete information on aggregate and aggregate production machinery, with helpful engineering tables and charts. Saves going through a lot of different books. Its 128 pages (that *lie flat*) tell you what you want to know—*fast*.

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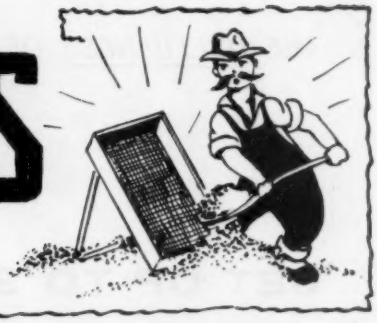
# SCREENINGS



## By RAY L. SMITH JR.

STRANGE are the ways of nature . . . her hurricane ways especially.

Donna, the nation's worst hurricane that crumbled concrete docks, razed homes and buildings and toppled uncounted trees, left fragile buttercups unscathed.

As The Keys plant lovers survey their gardens, and nursery operators try to explain vagaries of the chaos left in the Big Storm's wake, many find it difficult to make any sense to the floral and shrubbery picture.

Hundreds of coconut palms were flattened by the storm, but many of these, re-planted and propped against lesser winds are growing with new vigor and seem to have weathered the gale successfully.

Hibiscus, that crowning glory of the Keys, is blooming well with larger and more abundant blossom than in former years, and the fragile blue Plumbago vines are overflowing their borders in many gardens in areas that were inundated during the storm.

"It's strange," said one nursery man, "the salt water not only didn't seem to damage these delicate plants and grasses, but actually some of them are doing better than usual. Of course, this may be due to the tremendous rainfall we had with the storm and immediately afterwards."

Some bougainvillea vines have burst into brilliant bloom with renewed vigor, while some have been "burned" by wind or salt water, probably a combination of both, to a hopeless degree.

Such vagaries of nature, all nurserymen agree, are the main hazards of their business which is, indeed, a business of imponderables.

All agree that most fruit trees . . . especially mangos and avocados . . . were nearly completely destroyed. Here again, however, erratic "happenstances" have occurred. While some orange, lemon, lime and tangerines have been killed, others have thrived even after having been torn up by the roots and laid low.

"But that's mostly true of all living things," the nursery man says, "if we knew all these whys and wherefores, we'd be a lot richer than we are."

### Potpourri and Succotash

An Indian petitioned a judge of a Montana Court to give him a shorter name. "What is your name now?" asked the judge.

"Chief Screeching Train Whistle," replied the Indian.

"And to what do you wish to shorten it?" asked the judge.

The Indian folded his arms majestically and grunted, "Toots."

A small boy became lost at the race track. He was crying loudly when a policeman found him and asked him what was the matter. "I'm lost," said Willie.

"Oh," said the policeman. "Who were you with?"

"My father," said the lost child.

"And what's your father like?" the officer asked.

"Beer and women," sobbed Willie.

Then there was the bell ringer who got tangled in the rope and tolled himself off.

Professor: "I will not begin today's lecture until the room settles down."

Voice from the rear: "Go home and sleep it off."

Having been married 25 years, a couple decided to celebrate their anniversary by taking a little trip. While talking over their plans one evening, the husband now and then glanced into the next room where a little old lady sat knitting. "The only thing is," he said in a whisper, "is that for once I'd like to be by ourselves. I'd like to take this trip without your mother."

"My mother," exclaimed the wife, "I thought she was your mother."

Sign posted on Scottish golf course: "Members will kindly refrain from picking up lost balls until they have stopped rolling."

I used to be terribly conceited, but my psychiatrist straightened me out, and now I'm one of the nicest guys in town.

He: "Why does the average girl prefer beauty to brains?"

She: "Because the men that can see outnumber those who can think."

A socialite went into the salon of an eccentric but world-famous milliner. She announced that she needed a hat at once for a cocktail party.

The milliner took a couple of yards of ribbon, twisted it around and said, "There is your hat, madame."

The lady looked in the mirror and exclaimed, "It's wonderful!"

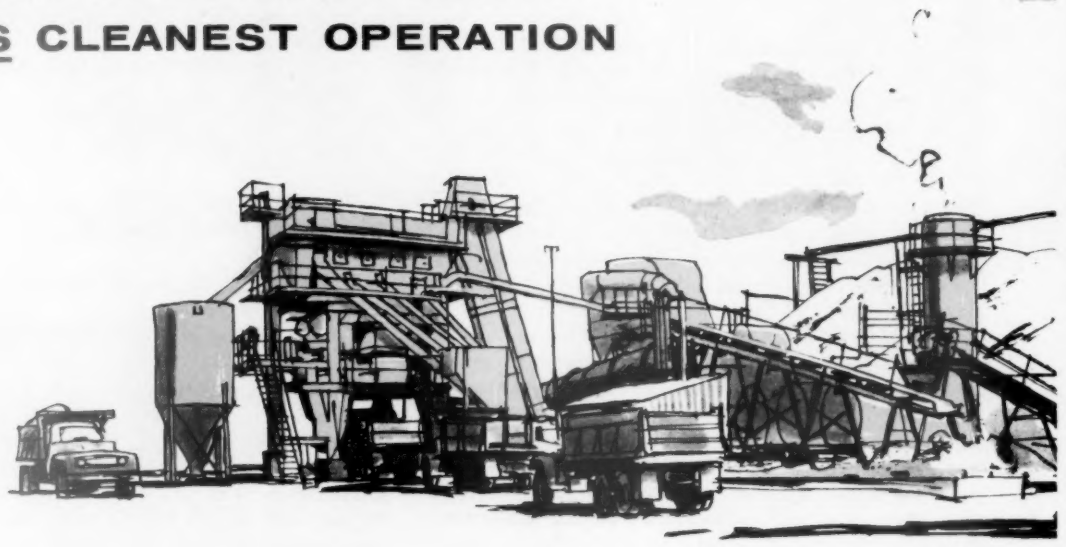
"Twenty-five dollars," said the milliner.

"But that's too much for a couple of yards of ribbon," protested the lady.

The milliner unwound the ribbon and handed it to her saying, "The ribbon, Madame, is free."

*THE USEFULNESS OF A LIMA MADSEN*

# GET UP TO 350 TPH WITH LOWER OPERATING COSTS PLUS CLEANEST OPERATION



Lima Madsen Asphalt Plants are big tonnage producers. They've proved this over and over again—even on the most exacting mix specifications. Built in batch capacities from 1000 to 10,000 lb. . . . there's a size and model—portable and stationary—to meet every asphalt mixing need.

Lima Madsen Asphalt Plants give you many money-making advantages. Better materials and superior workmanship reduce maintenance, add years of profit-making production. Better engineering increases accessibility for normal servicing. The Madsen Twin-Shaft Pug Mill Mixer combined with the Madsen Asphalt Pressure Injection System (Pat.) gives the operator of a Lima Madsen Plant the means of getting the fastest and most thorough mixing action in the industry. Fast, precision timing and weighing, a smooth cycle of operation with no bottlenecks and easier operating with less operator fatigue . . . these are some of the advantages you get with a Lima Madsen Asphalt Plant. See your distributor for the complete story or write us for free literature.

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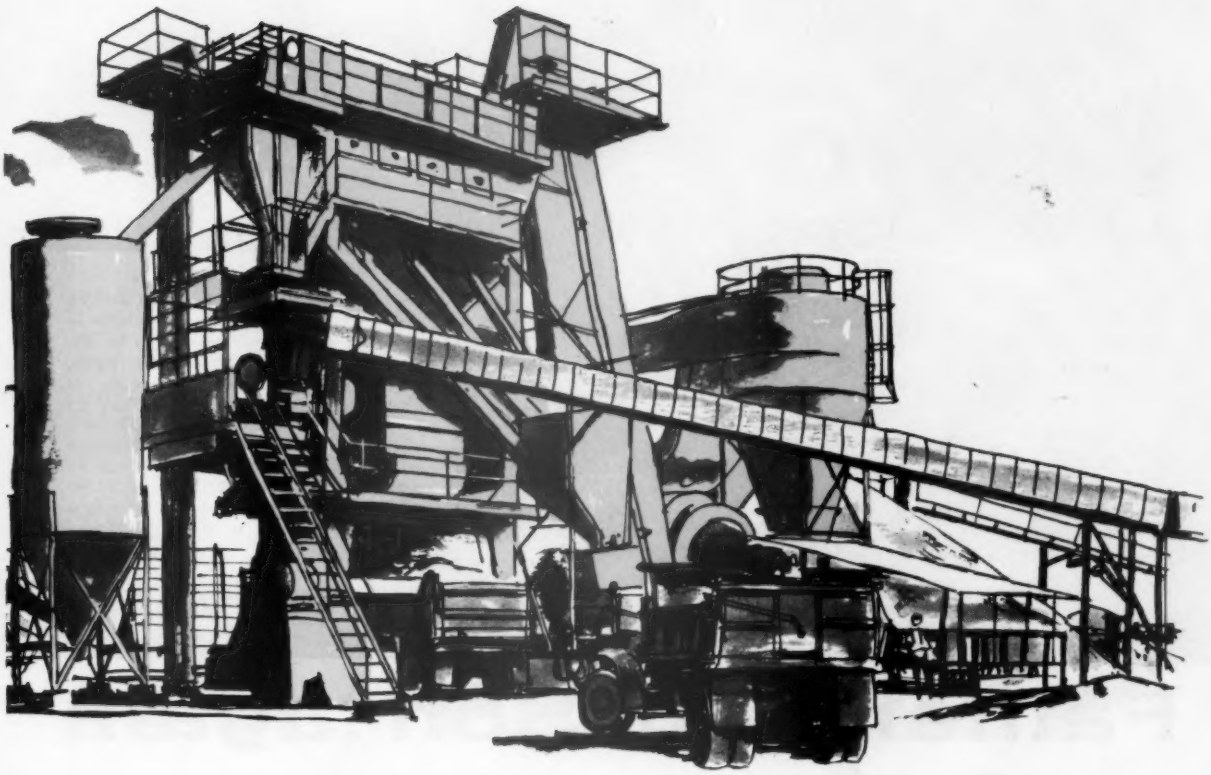
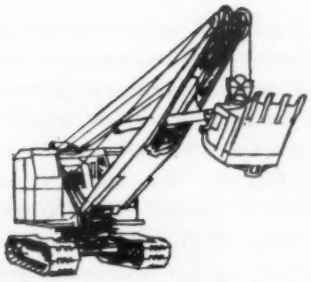
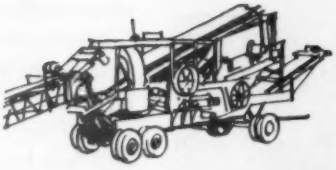
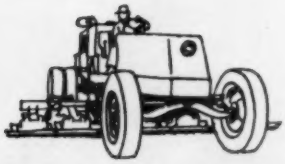




**LIMA SHOVELS** to 8 yd.; interchangeable as cranes to 140 tons on crawlers, 80 tons on rubber—draglines variable.



**LIMA AUSTIN-WESTERN** portable and stationary crushing, screening and washing equipment. Simplified design, easy maintenance.



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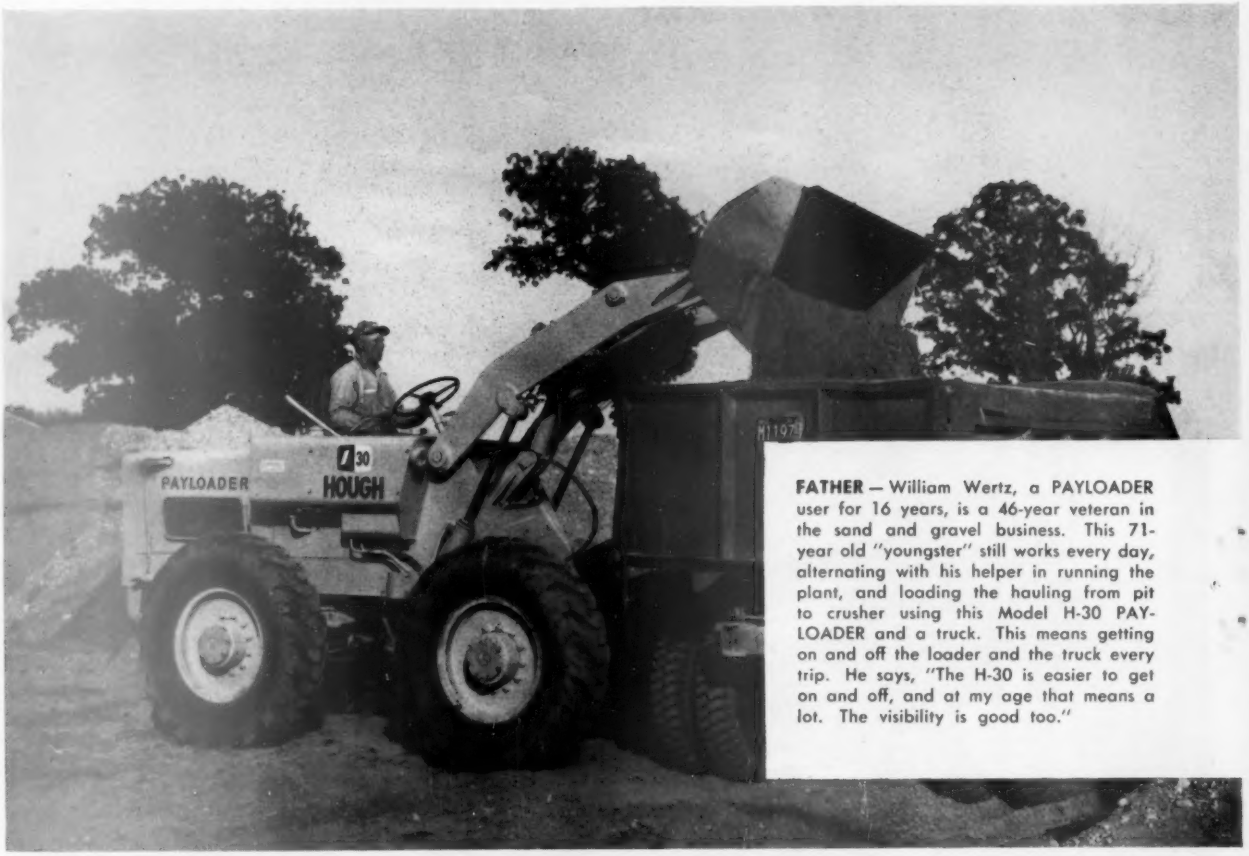


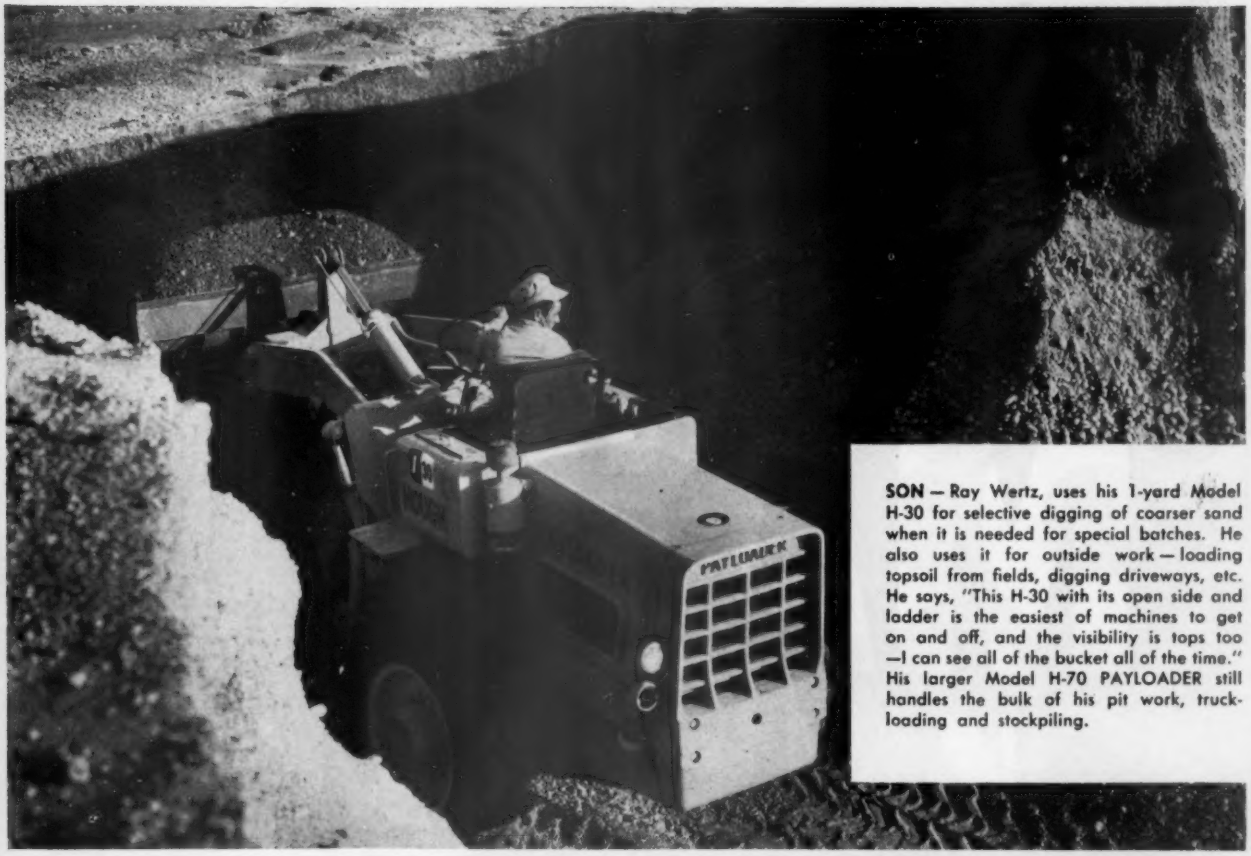

**FATHER** — William Wertz, a PAYLOADER user for 16 years, is a 46-year veteran in the sand and gravel business. This 71-year old "youngster" still works every day, alternating with his helper in running the plant, and loading the hauling from pit to crusher using this Model H-30 PAYLOADER and a truck. This means getting on and off the loader and the truck every trip. He says, "The H-30 is easier to get on and off, and at my age that means a lot. The visibility is good too."

# Father and Son again

Although William Wertz and his son, Ray, are friendly competitors in the sand-gravel business, they agree that, "it pays to use a PAYLOADER."

Just one year ago, a Hough advertisement reported on the use of PAYLOADER tractor-shovels by this same father and son in their separate sand-gravel businesses in Kenosha County, Wisconsin. In the meantime each one has purchased a new-design Model H-30 unit with 1-yard bucket. The father replaced a larger PAYLOADER, while the son's H-30 supplements his larger H-70. This H-70, with 2-yard bucket, still handles the bulk of his tonnage — feeds the crusher (100 tons per hour), loads trucks in the pit, loads customers' trucks and moves material from crusher to stockpile.

**PAYLOADER®**



**SON** — Ray Wertz, uses his 1-yard Model H-30 for selective digging of coarser sand when it is needed for special batches. He also uses it for outside work — loading topsoil from fields, digging driveways, etc. He says, "This H-30 with its open side and ladder is the easiest of machines to get on and off, and the visibility is tops too —I can see all of the bucket all of the time." His larger Model H-70 PAYLOADER still handles the bulk of his pit work, truck-loading and stockpiling.

# select PAYLOADER®

Ray Wertz, the son, says, "The PAYLOADER line is so well engineered that it will be a long time before anyone builds tractor-shovels to match them." Pit and plant operators, like the Wertz family have been profiting with PAYLOADER work-ability and dependability for 20 years. Today's PAYLOADER line consists of 20 models in 8 sizes with operating capacities from 2,000 to 12,000 lbs. — a type and size for every size job.

Your nearby Hough Distributor is ready to serve you with complete parts and service facilities backed by Hough field service personnel.

This 2-yard Model H-70 PAYLOADER continues to be Ray Wertz' main production loader for pit loading, crusher feeding, stockpiling and final loading.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

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More and more modern operators are coming to realize the only *profitable* operation is an *efficient* one. They further realize their screens, to a large degree, determine just how efficiently their plant operates. Many of these forward-looking operators are making the switch to Seco when they are adding or replacing screens. Why? Seco delivers three things that spell MORE PROFIT . . . (1) Greater tonnages (2) A higher degree of screening accuracy and (3) Less downtime. It's as simple as that . . . so, next time you consider the purchase of new screens . . . consider switching to SECO Screens for more profit per ton.

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12 fact-filled pages that will give you all the pertinent information you'll need as a guide to better screening with SECO.

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Using 4-yard bucket, new 900 Series AMERICAN proves its superior performance in limerock for Newberry, Corp., Newberry, Florida . . . a subsidiary of Duval Eng. & Contr. Co.

# "best balanced machine in its class"

That's what T. B. Bibby — veteran operator with 38 years on dragline work — has to say about the 900 Series AMERICAN pictured here.

New from the ground up, the 900 Series AMERICAN combines the *best of today's* operating features, plus *years ahead* advantages not available in any other 4½-yard excavator. For example:

Telescoping axles on the 900 Series let you extend crawlers outward an extra 2½ feet overall for greater full-circle operating stability. Crawler side frames can be detached by simply removing two large bolts . . . greatly speeds knock-down for travel. Continuous, deep-section deck channels, 4 feet deep at center, give you a machinery deck of unmatched strength and rigidity. Extra-wide drums permit single layer wrapping with 90 or 100 ft. dragline boom.

There's much more to tell about this new and important entry into the excavator field . . . graduated air controls . . . 18″ ground clearance . . . choice of direct drive, single or 3-stage torque converter . . . independent swing . . . power load lowering. See your AMERICAN distributor — he'll help you analyze the 900 Series in terms of profit-potential on *your* type of work.

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FORGED FITTINGS FOR
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***In memoriam . . .***

# James E. Montgomery

IT IS WITH great sorrow and a deep sense of personal loss that we announce to his many friends in the industry, the passing on December 11, 1960, of James E. Montgomery, chairman of the board of PIT AND QUARRY PUBLICATIONS. He was born February 9, 1884, in East Carrol Parish, La. Burial was in Old Chapel Churchyard, Millwood, Va.

Mr. Montgomery, better known as "Monty," had considerable publishing experience before he came to PIT AND QUARRY in 1916. Later he left for a few years to become vice-president of the International Trade Press, publishers of several magazines in the nonmetallic minerals and other fields. In 1933 he rejoined the PIT AND QUARRY organization, which subsequently purchased one of the above, *Cement Mill and Quarry*. He was elected vice-president in 1945, a director in 1947, and president in 1951. He became chairman in 1954 and continued to contribute his valuable experience almost up to the end.

During his long career he was active in national and local advertising groups and attended many of their meetings, as well as the conventions and meetings of the various industries and manufacturers in the PIT AND QUARRY and MODERN CONCRETE fields. He was a member of the National Industrial Advertisers Association (now (A.I.A.), the t.f. Club of Chicago, the Union League Club, and the Medinah Temple.

Mr. Montgomery was also a prominent lay leader in the Episcopal Church, diocese of Chicago, having served as deputy of the General Convention of the church in 1955. For 35 years he was a vestryman and warden of St. Peter's Church. He was a member of the Standing Committee of the Cathedral Chapter and of the department of church extension.

He is survived by his widow, Evelyn; a son, the Very Rev. James W. Montgomery, rector of St. John the Evangelist Church in Flossmoor, Ill.; a daughter, Mrs. Elise Hartung of New Orleans, La.; and five grandchildren.

We know that his many friends in many industries will miss his presence at the various meetings of these industries. We here will miss his cheerful, friendly personality and his wide knowledge of the publishing field.

# News of the Industry

## H. A. Sawyer of Lone Star Named New Chairman Of P.C.A. Directors

H. A. Sawyer, chairman of the board and president of Lone Star Cement Company, New York, N.Y., has been elected chairman of the board of directors of the Portland Cement Association.

Mr. Sawyer has been active in association affairs for several years, serving as a member of the board of directors since 1955.

Five new directors were also named to the association's board. They are L. E. Bayer, president of National Cement Company, Birmingham, Ala.; R. M. Craigmyle, chairman of the board of Giant Portland Cement Company, Philadelphia; H. R. Schemm, president of Huron Portland Cement Company, Detroit; Charles E. Shearer, president and chairman of the board of Keystone Portland Cement Company, Philadelphia; and Paul Sunderland, chairman of the board of Ash Grove Lime and Portland Cement Company, Kansas City, Mo.

H. A. Sawyer, right, newly elected chairman of the board is being congratulated by G. Donald Kennedy P.C.A. president.

## Expansion Plan Pays Off— In Doubled Production— At Utah Portland Cement

The Utah Portland Cement Company has virtually doubled its production by a $2,500,000 expansion program at its Salt Lake City plant.

More than $1 million was invested in a new 10- by 300-ft. long kiln with a capacity rated at 1,800 bbl. of cement daily. A new 11½- by 17-ft. ball mill with a daily capacity of 3,000 bbl. has been installed and weighing scales 60 ft. in length, sufficient to handle the largest bulk cement carrier were added. The firm has scheduled output of additional grades of cement.

More expansion is planned with the addition of storage facilities with a capacity of 135,000 bbl. which will bring the total silo storage to 200,000 bbl.

## Coming Events

January 17-19, 1961—Washington, D.C. Sixteenth annual convention, National Limestone Institute, Inc. Statler-Hilton Hotel.

January 17-20, 1961—Bal Harbour, Miami Beach, Fla. Annual convention, National Crushed Stone Association. The Americana.

January 23-26, 1961—Bal Harbour, Miami Beach. Joint convention, National Sand and Gravel Association and National Ready Mixed Concrete Association. The Americana.

January 28-February 1, 1961—Houston. Fifth annual convention, National Bituminous Concrete Association. Shamrock Hotel.

January 30-February 2, 1961—Detroit, Mich. 41st annual convention, National Concrete Masonry Association, and 12th Concrete Industries Exposition. Cobo Hall.

February 5-9, 1961—Los Angeles. 42nd annual meeting, Associated Equipment Distributors. Statler and Biltmore hotels.

February 20-23, 1961—St. Louis. 57th annual meeting and exhibit, American Concrete Institute. Chase-Park Plaza Hotel.

February 23-24, 1961—St. Louis. Annual meeting, Expanded Clay and Shale Association. Sheraton-Jefferson Hotel.

February 26-March 2, 1961—Boston. Annual convention, Associated General Contractors of America. Hotel Statler.

February 26-March 2, 1961—St. Louis. Annual meeting, American Institute of Mining, Metallurgical, and Petroleum Engineers. Ambassador and Chase-Park Plaza hotels.

May 11-13, 1961—Point Clear, Ala. Annual convention, National Lime Association. Grand Hotel.



Enter 25 on card, page 183 →

# "WE'RE PROUD TO SELL EAGLE AGGREGATE PROCESSING EQUIPMENT"

*—Fred Woltman, Vice President*
*Tractor & Equipment Co., Oak Lawn, Ill.*

The recent comments of one of our distributors make a better advertisement than we could ever write and we asked permission to reproduce them here.

"We are proud to sell Eagle Aggregate Processing Equipment because it does everything the Eagle Iron Works claims for it and we have a lot of satisfied customers as a result.

"Not many manufacturers go to the trouble that Eagle does to make sound recommendations and to see that their equipment is properly applied—it is a pleasure to work with them. Furthermore, their many years in the business and the hundreds of successful installations to their credit enable them to speak with authority—Eagle does not indulge in guesswork. We can sell their equipment with confidence.

"While many ideas developed and proved in the field by Eagle have been boldly copied by other manufacturers—such as their Water Scalping-Classifying Tank—Eagle offers something that cannot be copied, and that is EXPERIENCE—that only comes with time—with successfully solving all kinds of aggregate processing problems year after year.

"We sold a large Eagle Sand Washing-Dehydrating Classifying Section with an Eagle Log Washer to MATERIAL SERVICE, DIVISION OF GENERAL DYNAMICS CORP., for their floating plant at Morris, Illinois. This highly efficient plant is capable of producing 850 tons per hour of 4 types of specification sand simultaneously, the sweetest material you ever saw. Eagle's engineers and our own teamed up with Material Service engineers to give them what they wanted. We are mighty proud of this plant."

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## EAGLE IRON WORKS

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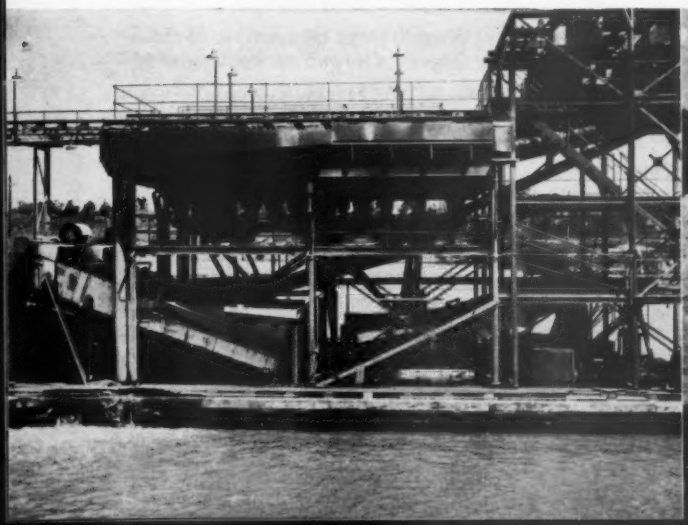
Plant is mounted on 3 barges. The double Eagle Sand Section is on the first barge closest to the dredge. It consists of four 38′ Water Scalping-Classifying Tanks with 11 valves each and four double-screw Washer-Classifier-Dehydrators.

Barge-loads of specification sand—1500 tons per barge—ready for market—every ton economically cleaned and classified by the Eagle floating Sand Section. Send for Catalog describing Eagle Sand Processing Equipment in detail.



## Construction Put in Place During November Above Seasonal Pace

The value of new construction put in place in November, 1960, amounted to $4.8 billion, according to preliminary estimates of the U. S. Department of Commerce. This amount was 5 percent less than in October—compared to a normal 6 percent seasonal decline—and 2 percent more than in November, 1959.

The department noted that comparisons with data for 1959 should take into consideration that the latter months of 1959 reflect the effects of steel shortages resulting from the 1959 steel strike.

Cumulative value for new construction expenditures in the first 11 months of 1960 was estimated at $50.7 billion—2 percent less than the total for the first 11 months of 1959.

*ITEMS:* Private construction, estimated at $3.4 billion, was 3 percent less than expenditures in both the previous month and in November, 1959. Residential was estimated at $1.9 billion—4 percent less than October — a fairly normal change for the period.

*ITEM:* Public construction, estimated at $1.4 billion, decreased by 10 percent from October—less than the normal 12 percent drop from October, and up 16 percent from November, 1959.

## R. B. Lloyd Elected President In Realignment at Warner

Reese B. Lloyd has been elected president, chief executive officer, and a director of Warner Company, Philadelphia, Pa., it has been announced.

Mr. Lloyd formerly was president, chief executive and chairman of the board of the Heintz division of Kelsey-Hayes Company.

Other changes announced at the same time were:

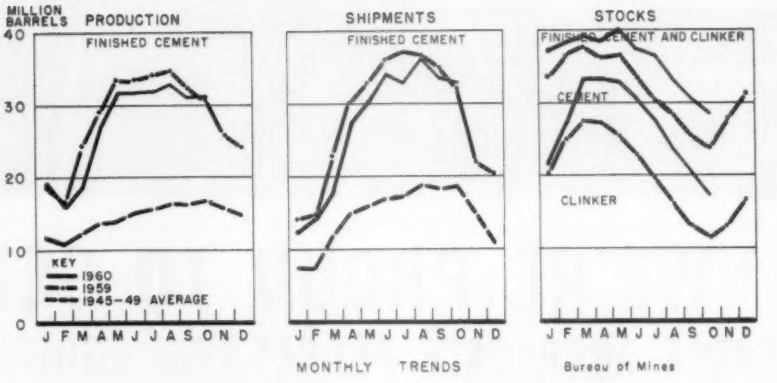
Robert C. Collins, who had been acting president, resigned and was elected chairman of the board.

Reed C. Bye, who had been acting chairman of the board, retired but will continue as a director and be available as a consultant.

Fred Fox, a member of the board since 1957, has been elected chairman of the executive committee.

---

West End Chemical Company, a division of Stauffer Chemical Company, has begun construction on an additional sodium sulphate production unit at Westend, Calif. Scheduled to go on stream early next summer, the expansion will raise West End's sodium sulphate output to 200,000 tons per year.




### — October, 1960, Finished Portland Cement —

SUMMARY—Production of finished portland cement in October, 1960, as reported to the U. S. Bureau of Mines, totaled 31,449,000 barrels—an increase of 1 percent compared with October, 1959. Mill shipments totaled 32,931,000 barrels—an increase of 2 percent compared with October, 1959. Stocks of 28,725,000 barrels of finished portland cement on hand were 20 percent more than those on hand October 31, 1959. Clinker production during October, 1960, totaled 28,735,000 barrels—a decrease of 3 percent compared with October, 1959.

Hawaii became a producing state in October by the addition of a new plant at Honolulu. The plant in Midlothian, Tex., reported production for the first time.

▲ PRODUCTION—One hundred and seventy-four plants in 39 states and Puerto Rico reported a production of 31,449,000 barrels of finished portland cement during October, 1960, compared with 31,127,000 barrels produced in October, 1959.

Production of clinker was 28,735,000, compared with 29,588,000 barrels during the same month last year.

High-early-strength portland cement totaled 1,145,000 barrels—a decrease of 4 percent compared with October, 1959, production.

Prepared masonry cement production of 1,309,000 barrels decreased 4 percent from the October, 1959, production.

▲ SHIPMENTS—Mill shipments of finished portland cement from one hundred and seventy-five plants totaled 32,931,000 barrels, compared with 32,282,000 barrels in October, 1959.

Shipments were higher in 12 districts and lower in 11 districts. The greatest increases were in the Indiana-Kentucky-Wisconsin and Colorado-Arizona-Utah-New Mexico districts.

Mill shipments of high-early-strength portland cement totaled 1,263,000 barrels—a decrease of 2 percent from the 1,285,000 barrels shipped in October, 1959.

Mill shipments of prepared masonry cement totaled 1,339,000 barrels—a decrease of 6 percent from the 1,419,000 barrels shipped in October, 1960. Prepared masonry cements are shown in 376-lb. barrels although they are sold in barrels of varying weights.

▲ STOCKS—Mill stocks of 28,725,000 barrels of finished portland cement were on hand on October 31, 1960—an increase of 20 percent over the 23,913,000 barrels on hand October 31, 1959. Stocks of clinker on hand totaled 17,259,000 barrels—an increase of 48 percent over the 11,681,000 barrels on hand October 31, 1959.

▲ FIRST TEN MONTHS OF 1960—For the January-October period, the production volume of finished cement amounted to 271,946,000 bbl., compared with 288,324,000 bbl. in the 1959 ten-month period. Total shipments for the first ten months of 1960 are reported at 272,185,000 bbl.; in the same period of 1959 total shipments were 292,699,000 bbl. (Shipment figures do not include finished cement used in the manufacture of prepared masonry cement, as follows: October, 1959—241,000 bbl.; January-October, 1959—2,471,000 bbl.; October, 1960—248,000 bbl.; January-October, 1960—2,331,000 bbl.) ●

## Washington Operations Sold— Quarry Output to Be Upped

A. W. Hammond, South Bend, Wash., has sold his sand operation on a 60-acre site at Hoquiam, Wash., to Public Utility District No. 1 of Grays County.

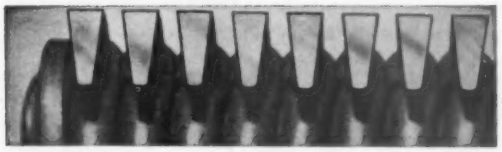
He has also leased his quarry at Raymond, Wash., to H. G. Runyan, Raymond, Wash. The new owner plans to rebuild the plant, adding grizzly feed, larger crushers and handling equipment. Output will be increased to 1,000 t.p.d.

# HOW TO SELECT DEWATERING SCREENS THAT FIT YOUR REQUIREMENTS EXACTLY

## How to select Perforated Plate

Let Hendrick suggest the analysis of H Quality Steel that will stand up longest under your operating conditions. Eliminate blinding with a Hendrick screen that provides full clearance. Get continued product uniformity from the accurate, uniform mesh of a Hendrick screen.

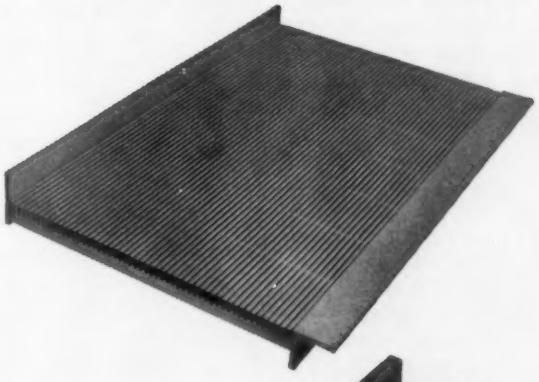
## How to select Wedge Wire

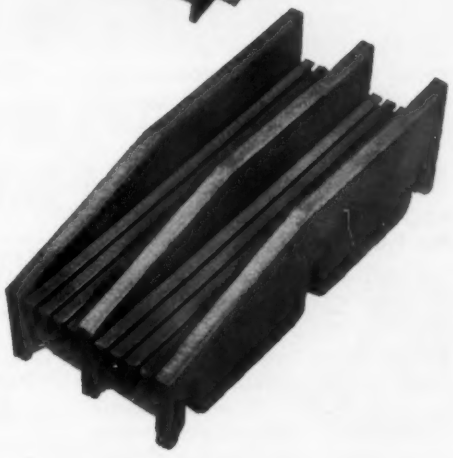


Here are three things to look for: 1) Free clearance—to reduce chances of clogging and blinding. 2) A tapered profile bar, for dewatering efficiency. 3) A deep profile bar, to assure long service life and maximum load-carrying capacity. Get all of these in Hendrick Wedge Wire. There is a type to suit your operating conditions and your needs—whether you want good screening efficiency, good dewatering efficiency, or high resistance to abrasion.

## How to select Wedge Slot Screens

For more efficient processing, look for accurately spaced, uninterrupted slots. For heavy-duty service, look for thick, parallel head flanges that maintain uniformity of openings. To prevent abrasion by large chunks, specify Skid Bars. Hendrick offers all of these—*plus* 8 different profile bars. Hendrick will gladly help you select the type that will stand up best under your operating conditions.





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## Pittsburgh Coke-Chem Sells Green Bag Cement To Marquette Cement

Spokesmen for the Marquette Cement Manufacturing Company and Pittsburgh Coke and Chemical Company have announced the execution of an agreement whereby Marquette will acquire all of the outstanding stock of Green Bag Cement Company, a wholly-owned subsidiary of Pittsburgh Coke and Chemical. For the acquisition of Green Bag, Marquette will issue 150,000 common shares of its stock to Pittsburgh Coke and Chemical Company, which will retain the Marquette stock as an investment. The acquisition is scheduled to be consummated on January 17, 1961.

Marquette has cement producing plants at Oglesby, Ill.; Des Moines, Iowa; Cape Girardeau, Mo.; Nashville and Cowan, Tenn.; Brandon, Miss.; Superior, Ohio; Rockmart, Ga.; and Milwaukee, Wis. Shipping plants are located at Chicago, St. Louis, Memphis, Tenn., and Vicksburg, Miss.

Green Bag Cement Company has a cement producing plant on Neville Island at Pittsburgh, Pa., and shipping plants at Marietta, Ohio, and Fairmont, W. Va. Under Marquette ownership it is contemplated that these facilities and present personnel will continue to produce, sell, and ship Green Bag products as heretofore.

## FCC Restores 4 Frequencies For Industrial Application

Effective November 30, 1960, the 49.52 to 49.60 Mc band was restored for use in the special Industrial Radio Service, according to a recent Rules amendment adopted by the Federal Communications Commission. This important ruling means that four additional low-band frequencies are available for use by association members.

This action was taken in response to efforts of the National Sand and Gravel Association, the National Ready Mix Concrete Association, and other groups during the last year to have this important frequency band restored. It had been withdrawn for scatter operations in April, 1958.

Not only will these frequencies be of assistance in helping to relieve low-band frequency congestion which has been and will remain a serious problem in the Special Industrial Service; they will also provide members operating in the adjacent 49.6-50.0 Mc band who were faced with a December 31, 1960, deadline to vacate these channels, with a means of continuing such operations without serious obsolescence of equipment and inconvenience in shifting channels. Further, for producers still operating in the 49.52-49.60 Mc band, the restoration order means that they may remain where they are without suffering the loss and dislocation of changing channels.

As proposed by the FCC, the 49.52 and 49.56 Mc frequencies will be made available for the exclusive use in the Special Industrial Radio Service. The two remaining channels, 49.54 and 49.58 are to be restored for shared use with the Forest Products Radio Service, with which the Special Industrial Radio Service shared the channels before their withdrawal on April 1, 1958.

## Cement Plant to Be Opened At Colombia-Venezuela Border

A 300-ton-a-day cement plant is scheduled to go into operation soon in the city of Cucuta, Colombia, near the Venezuelan border. It is reportedly a joint venture of the Fabrica de Cemento Samper of Bogota and Cia. de Cementos Hercules, S. A. of San Gil, Colombia.

Initial production will be at the rate of 150 tons a day. Equipment for the semi-automatic plant was purchased in the United States.

## Lime Sold and Used in September, 1960

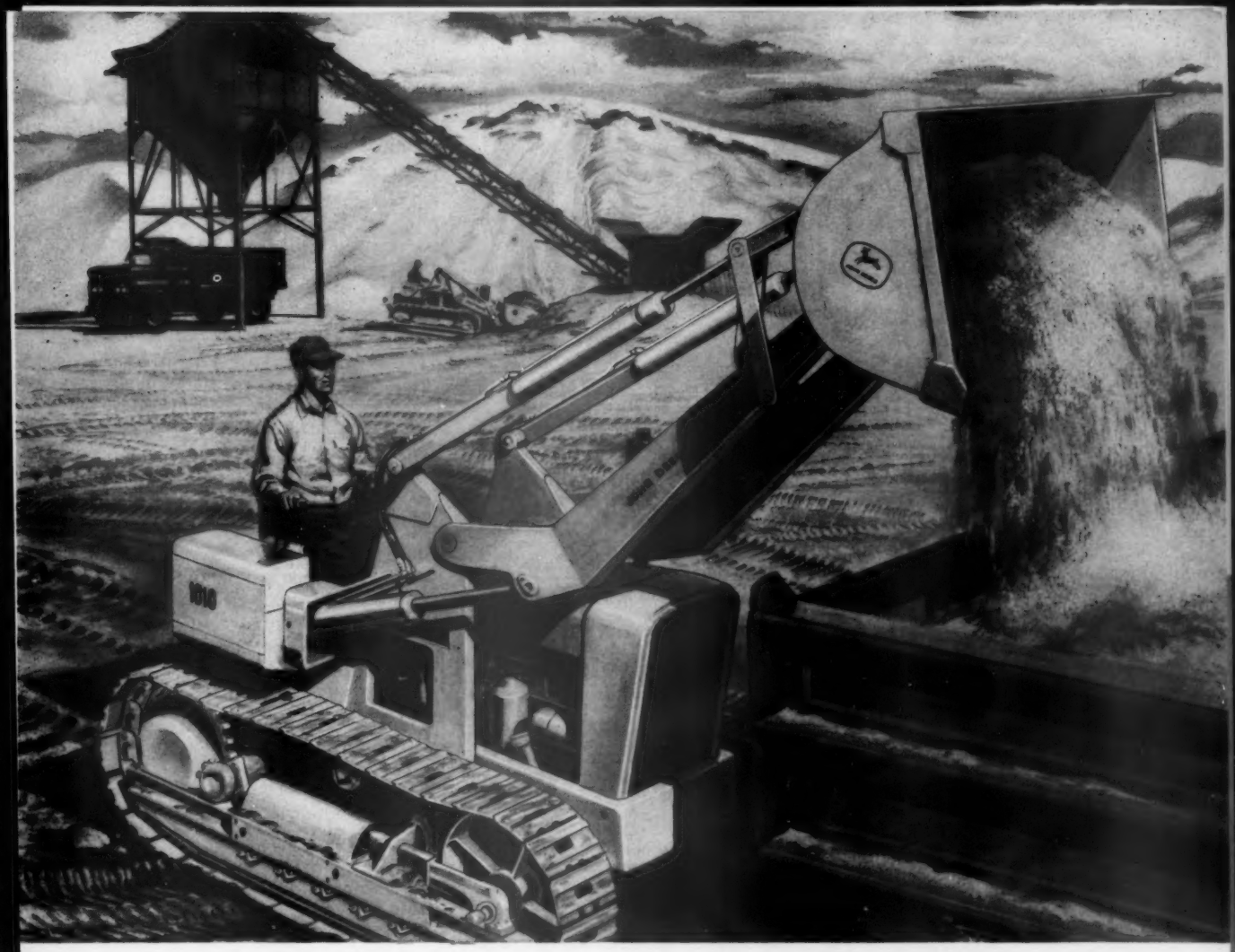
Lime sold and used in the United States, in September, 1960, totaled 979,885 short tons—a slight decrease from the August output—according to reports by producers to the U. S. Bureau of Mines.

Chemical and other industrial lime increased, whereas decreases were noted in agricultural, construction, and refractory uses. Open-market lime constitutes approximately two-thirds of the total lime reported, and the remaining one-third is captive tonnage.

**Lime Sold and Used by Producers* in the United States, in Specified Periods of 1959-60, by Types and Major Uses in Short Tons**

| | August | September | | January-September | |
|---|---|---|---|---|---|
| | 1960 | 1960 | 1959 | 1960 | 1959 |
| By types: | | | | | |
| Quicklime | 742,585 | 745,776 | 476,076 | 6,987,140 | 5,254,050 |
| Hydrated lime | 256,693 | 234,109 | 196,732 | 2,074,901 | 1,549,400 |
| Total lime | 999,278 | 979,885 | 672,808 | 9,062,041 | 6,803,450 |
| By uses: | | | | | |
| Agricultural: | | | | | |
| Quicklime | 5,480 | 4,301 | 5,683 | 43,907 | 52,805 |
| Hydrated lime | 6,613 | 5,995 | 7,828 | 80,997 | 88,351 |
| Total | 12,093 | 10,296 | 13,511 | 124,904 | 141,156 |
| Construction | | | | | |
| Quicklime | 7,318 | 6,919 | 29,938 | 62,515 | 116,160 |
| Hydrated lime | 95,614 | 82,437 | 93,564 | 714,736 | 752,904 |
| Total | 102,932 | 89,356 | 123,502 | 777,251 | 869,064 |
| Chemical and other industrial: | | | | | |
| Quicklime | 596,436 | 607,903 | 392,991 | 5,307,156 | 3,618,060 |
| Hydrated lime | 154,466 | 145,677 | 95,340 | 1,279,168 | 708,145 |
| Total | 750,902 | 753,580 | 488,331 | 6,586,324 | 4,326,205 |
| Refractory (dead-burned dolomite) | 133,351 | 126,653 | 47,464 | 1,573,562 | 1,467,025 |

*The monthly canvass excludes output of plants producing less than 10,000 tons a year.



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**AND**
**MATERIAL**
**HANDLING**
**EQUIPMENT**

Mr. Knoblock, during working days, at the plant of Drummond Incorporated, where he served for 16 years as general manager.

### Curt G. Knoblock Retires As Drummond, Inc., Manager

Curt G. Knoblock recently retired as general manager of Drummond Incorporated, Drummond Island, Mich.

Mr. Knoblock's retirement, effective January 1, 1961, will end 16 years of service at this 2,500,000-ton stone crushing plant. He will be succeeded by Arvin Mueller of Sheboygan, Wis., formerly drilling and blasting superintendent, at the Drummond plant.

In 1936 he became general manager of the Sturgeon Bay Company, which is now Drummond Dolomite Incorporated. In 1944 the latter moved to Drummond Island.

Mr. Knoblock laid out the present mill site on DeTour Passage and supervised the transfer of machinery from Sturgeon Bay to Drummond. The Drummond plant began production in 1946, when 250,000 tons of stone were shipped. Within five years production increased tenfold to 2,500,000 tons. This plant employs over 200 men.

### British Firm Buys Interest In Canada Cement Company

The Associated Portland Cement Manufacturers (England) have purchased 10 percent of the shares of Canada Cement Company Limited. The Canadian company is the largest producer in Canada, with a productive capacity of 24,000,000 bbl. per year. It operates nine plants.

The British company is the parent concern of a group operating 29 plants in the United Kingdom. It also has interests in plants in several other countries.

The two companies plan an exchange of technical and engineering information. Acquisition of shares of the Canadian company in no way alters the policies and control of the company.

### Safe Use of Ammonium Nitrate Discussed in New Bulletin

A bulletin entitled *Tentative Safety Recommendations for Field-Mixed Ammonium Nitrate Blasting Agents* (Bulletin I.C. 7988) has been published by the U. S. Bureau of Mines. It is especially timely due to the rapidly growing use of these agents for blasting. Preparation, storage, transportation, and use of field-mixed blasting agents are discussed.

Single copies can be obtained free from the U. S. Bureau of Mines, Publications Distribution Section, 4800 Forbes Ave., Pittsburgh 13, Pa.

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## Oct. Construction Awards At Record-Making Level Indicate Future Activity

A new all-time record for the month was set in October for future construction contracts as sharp gains in contracts for commercial buildings and highways boosted awards to a total of $3,319,145,000 —up 6 percent over October, 1959.

F. W. Dodge Corporation economists noted that the contracts awarded indicate high levels of construction activity for many months to come. Because construction is the nation's largest fabricating industry, this activity will help to insure that the current business dip will be mild and of short duration.

After adjustment for normal seasonal factors, the Dodge Index of contracts surged upward to 294 (1947-49=100), the highest level since April, 1959. The Index was 271 in September, 1960, and 276 in August.

Compared with October, 1959, contracts for non-residential buildings rose 16 percent, with commercial buildings leading the way. In contrast, factories and religious building contracts fell somewhat. Heavy engineering contracts bounced up 24 percent, sparked by a 47 percent rise in contracts for streets and highways.

Contracts for residential buildings were down 8 percent from the comparable 1959 month, but in recent months have edged closer to last year's levels.

A summary of the latest figures follows:

| | October, 1960 | October, 1959 | % Change |
|---|---|---|---|
| Nonresidential bldg. | $ 1,164,699,000 | $ 1,003,457,000 | +16% |
| Residential bldg. | 1,390,402,000 | 1,514,953,000 | — 8% |
| Heavy engineering | 764,044,000 | 616,090,000 | +24% |
| Total construction | $ 8,319,145,000 | $ 3,134,500,000 | + 6% |
| | 10 Mo. 1960 | 10 Mo. 1959 | % Change |
| Nonresidential bldg. | $10,358,500,000 | $ 9,821,196,000 | + 5% |
| Residential bldg. | 13,006,031,000 | 15,077,614,000 | —14% |
| Heavy engineering | 7,422,994,000 | 6,815,217,000 | + 9% |
| Total construction | $30,787,525,000 | $31,714,027,000 | — 3% |

---

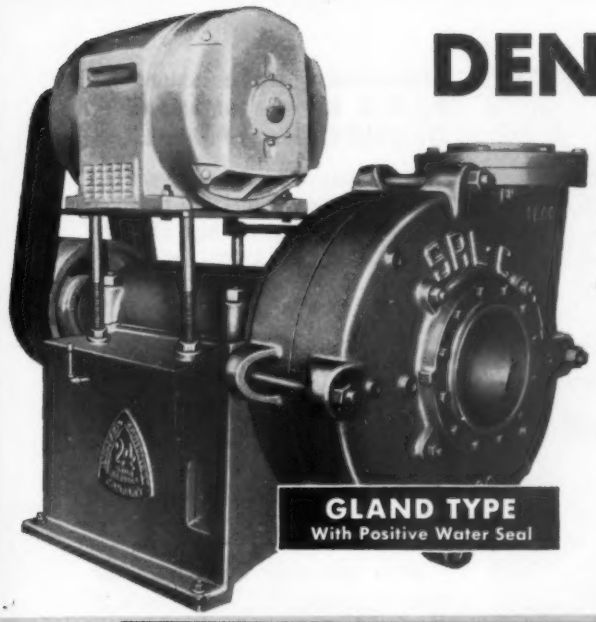
According to the local press, a new cement facility, that of Cemento Atlantico, S. A., is expected to be under construction in the Las Minas Bay area of Panama soon. One of the four vertical kilns (of Swiss manufacture) reportedly will be in operation early next year. Coral will be used as aggregate.



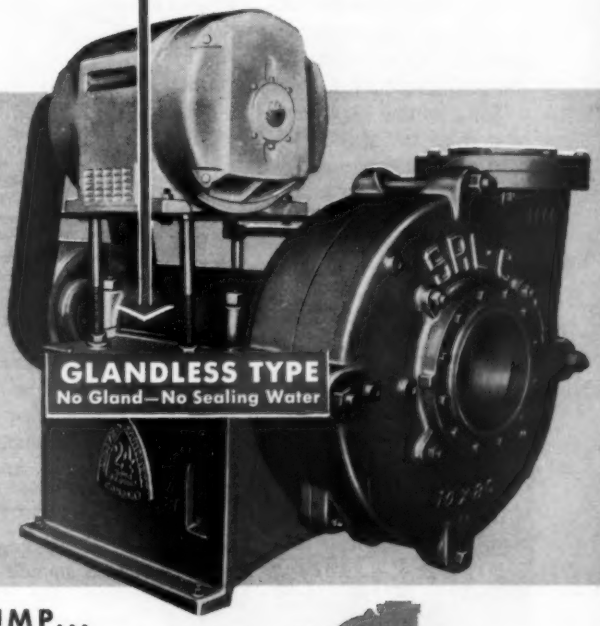
Enter 31 on card, page 183 →

# DENVER SRL PUMPS

## Now available in TWO Models




**FOR AN EVEN WIDER RANGE OF PUMPING APPLICATIONS**

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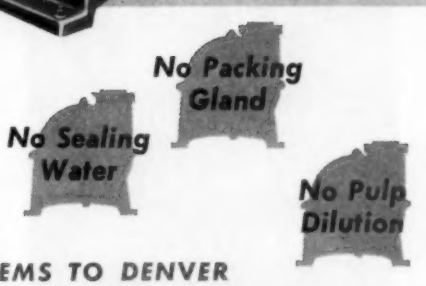
Specifications and Dimensions

| Pump Size and Type | Capacity 60' Head RPM | HP | *Water GPM | Dimensions (In.) L | W | H | Approx. Shipping Wt. Lbs. |
|---|---|---|---|---|---|---|---|
| GLAND TYPE | | | | | | | |
| 1¼"x1" | 2000 | 1.1 | 30 | 20 | 12½ | 13 | 135 |
| 1½"x1¼" | 1790 | 2.2 | 70 | 25 | 17 | 19 | 300 |
| 2½"x2" | 1600 | 5.2 | 170 | 25½ | 17½ | 19½ | 325 |
| 3" x3" | 1520 | 8.6 | 300 | 31¼ | 19¾ | 21 | 500 |
| 5" x5" | 1190 | 25.3 | 1000 | 37¾ | 26¼ | 30 | 980 |
| 6" x6" | 1125 | 30.3 | 1400 | 45¼ | 28½ | 33 | 1320 |
| 3" x3" –C | 1550 | 8.4 | 300 | 37½ | 21½ | 23 | 780 |
| 5" x4" –C | 1145 | 16.3 | 700 | 40¼ | 27 | 29 | 1200 |
| 8" x6" –C | 882 | 29.5 | 1400 | 57 | 36½ | 38 | 3000 |
| 10" x8" –C | 770 | 61.0 | 2900 | 64¾ | 43 | 44 | 4000 |
| 12" x10"–C | 615 | 96.0 | 4600 | 69⅝ | 46½ | 49 | 5300 |
| "TRU-GLANDLESS" Type (TG) | | | | | | | |
| 1¼"x1" TG | 2000 | 1.1 | 30 | 20 | 12½ | 13 | 135 |
| 3" x3"–C TG | 1550 | 9.4 | 300 | 37½ | 21½ | 23 | 780 |
| 5" x4"–C TG | 1145 | 18.3 | 700 | 40¼ | 27 | 29 | 1200 |
| 8" x6"–C TG | 882 | 33.0 | 1400 | 57 | 36½ | 38 | 3000 |
| 10" x8"–C TG | 770 | 70.6 | 2900 | 64¾ | 43 | 44 | 4000 |

*Based on water. Multiply horsepower by specific gravity of pulp to obtain actual brake horsepower.

## DENVER "TRU-GLANDLESS" SRL PUMP... A MAJOR ADVANCE IN PUMP DESIGN

DENVER SRL Pumps with positive water seal already have a world-wide reputation for their high efficiency, low part cost, long life. If dilution of pulp or slurry is a problem, you now get the extra advantage of "TRU-GLANDLESS" construction. Requires no sealing water, no packing glands, eliminates pulp dilution.

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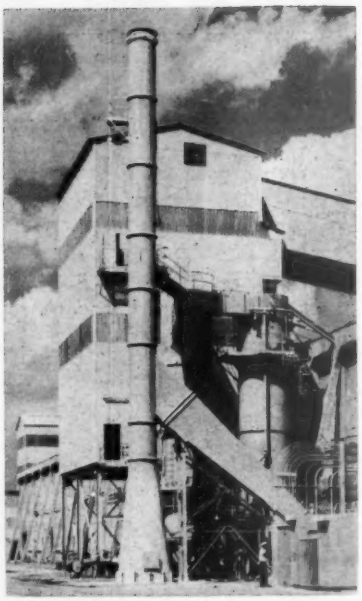
## Wright, Cox, Sunderland Promoted to New Posts On Staff of Ash Grove

The election of three executive officers of Ash Grove Lime and Portland Cement Company, Kansas City, Mo., has been announced. The promotions become effective January 1, 1961.

Purd B. Wright has been elected president. He was formerly vice-president in charge of sales and advertising. Robert M. Cox has been elected executive vice-president, and Robert Sunderland, vice-president and treasurer.

Mr. Wright joined the company in 1946 as sales manager. As president, he fills the vacancy created by the retirement of Lawrence Kittle.

Since joining the company in 1927 as a sales statistician, Mr. Cox has held many positions of responsibility with Ash Grove and with the cement industry. He was most recently vice-president. During 1960 he was national chairman of safety activities for the Portland Cement Association.



This structure represents an investment of more than $500,000 to reduce emission from American Cyanamid Company's triple superphospate curing building at Brewster, Fla. In the foreground are the scrubbers, which capture gaseous fluorides drawn off from triple superphospate by equipment inside.

• • • • • •

Mr. Sunderland joined Ash Grove in 1947 and has served in several executive positions as including credit manager, assistant treasurer, secretary, and treasurer.

---

Three new vice-presidents have been named for Drummond Dolomite, Inc., dolomite and riprap producer in Cleveland, O., and Sheyboygan, Wis. The three were long associated with the firm, and their new titles are as follows:

J. P. FEICK, vice-president, marketing; M. F. KUMMER, vice-president, industrial relations; and R. L. MILLER, vice-president, plant operations.

---

EDWIN D. SWEENEY, Zanesville, Ohio, has been appointed a sales representative for the Dundee Cement Company at Columbus, Ohio. He had formerly served as sale representative for the National Gypsum Company.

JOHN D. MACDOUGALL was named a sales representative at Cleveland, Ohio. He was previously affiliated with Cleveland Builders Supply Co. and Celotex Corp.

## Preliminary Data Issued By U.S. Bureau of Mines On 1960 Cement Production

Shipments of portland cement decreased 9 percent in 1960 to 305,000,000 bbl. from the high of 330,000,000 bbl. in 1959, the U. S. Bureau of Mines reports. Severe winter conditions in the early months of 1960 and heavy rains during the summer slowed construction work, causing lower demand for cement. Shipments of masonry cement dropped 9 percent (to 14,600,000 bbl.) from 16,200,000 bbl. in 1959. Shipments of natural and slag-lime cement were about the same in 1960 as in 1959.

Five new cement plants were opened during 1960, one each in Hawaii, Michigan, Ohio, Oklahoma, and Texas. Gains in production capacity were reported at seven plants and these, in addition to the new plants, raised the annual capacity from 420,000,000 bbl. to 428,000,000 bbl. at the end of 1960.

Imports of cement decreased 21 percent to 4,200,000 bbl., and were greatest in the Connecticut, Florida, New York, and Massachusetts customs districts.

### 1961 Enrollment Under Way For Safety Training Institute

Enrollment is now open for the 1961 sessions of the Safety Training Institute, an event sponsored by the National Safety Council. The institute includes a series of one-week courses in accident prevention for professional safety men. Sessions will be held at the council's offices, 425 N. Michigan Avenue, Chicago 11, Ill.

The four courses cover the following: (1) fundamentals of industrial safety; (2) safety management techniques; (3) industrial hygiene for safety engineers; and (4) radiation safety, a specialized course on radiation problems in plants.

### • Correction

The figures for the value of finished fluorspar produced in 1958 and 1959 were incorrectly given in an item on page 48 of our November issue. The correct figures are as follows: $15,071,000 (1958) and $8,680,000 (1959).


Rexarc

"King of the Arc"

•

The Complete Hard Facing Line MANUAL and AUTOMATIC

•

Write for Free Brochures

Rexarc INCORPORATED

WEST ALEXANDRIA, OHIO, U.S.A.

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# NEW HANCO FLUX POWER SCREEN HEATERS

PHENOMENAL — POWER IS CONDUCTED THROUGH THE AIR

- DUAL VOLTAGE 220/440/550 volt
- 3 PHASE on larger models
- 5-YEAR GUARANTEE
- ANTI-MAGNETIC SIDE RAILS Either type as shown below

- DUST-TIGHT
- WATERPROOF
- COMPACT, RUGGED CONSTRUCTION
- SCREEN CLOTH INSULATION On both sides for complete protection

Pat. Appl. for

Flux Power Eliminates Z-Bar Connectors
Use either Plain or Stainless Cloth

This major break-through by HANCO ENGINEERS OFFERS OPTIMUM EFFICIENCY in screening and sizing of moist materials. Replacement of cables and laminated flexible conductors is eliminated.

HANCO HEATER VERSATILITY permits optional location on various types of screens.

HANCO EXTENDS LIBERAL TRADE ALLOWANCE.

For Abrasive Materials

AVAILABLE WITH EITHER TYPE TENSIONING RAIL

For Non-Abrasive Materials

A DIVISION OF HANNON ELECTRIC CO.

Hanco

**F. R. HANNON & SONS**
**CANTON 7, OHIO, U.S.A.**
**CABLE: HANCO**

EUROPEAN SALES AND MFG.
HANCO INTERNATIONAL
WIBAUTSTRAAT 6
AMSTERDAM, HOLLAND



Enter 33 on card, page 183

Checking gear teeth for accuracy after cutting.

# products

Continuous expansion of facilities maintain The Tool Steel Gear & Pinion Co. leadership in supplying the cement industry with products and services of superb quality. For example, Tool Steel's Maag gear cutter is the biggest in the world. It can cut gear teeth on gears with a 197" diameter and a 20.8" face. It can cut helical gears up to 190" diameter, 15 degree helical; and 177" diameter and 30 degree helical. High quality precision cutting, combined with a rapid delivery schedule, is a service that cement plants receive when they send their big gears to us for cutting or recutting.

"Tool Steel Process" hardened products are available for practically every key point in cement equipment, including pulverizers, mixers, drag lines, kilns, dryers, shovels, cranes.

Big 11½ foot cement mill ball gear being recut at Tool Steel.

# and service unlimited

TSP Hardened Products are specifically designed, produced and guaranteed to out-perform, out-last any competitive product in the same service. A special hardening process achieves a file hard surface to the full depth of permissible wear. The core is refined for toughness and ductility. If you're interested in keeping your equipment running better and longer, write today for a free copy of our fully illustrated brochure "TSP Products for the Cement Industry."

THE TOOL STEEL GEAR AND PINION CO.

CINCINNATI 16, OHIO, U.S.A.

The Standard of Quality Since 1909 for Gears • Pinions • Rolls • Wheels and Other Hardened Products

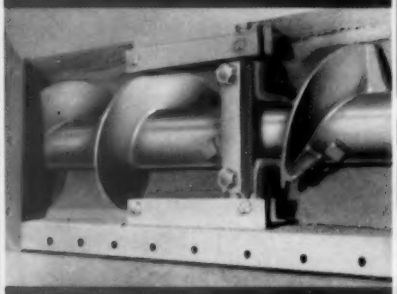
Printed in U.S.A. AD 1043

Close-up of TSP wheels on bucket crane after several years service.

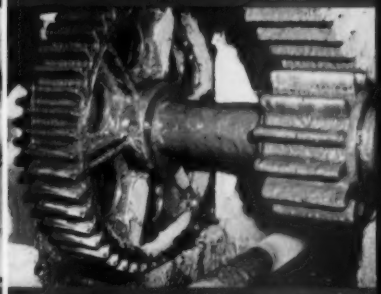
TSP trunnions and gearing on rotary dryer.

Close-up of TSP trunnions and shaft on kiln. Note smooth appearance after long service.

TSP compartment mill drive pinion in continuous service since 1938 and still in excellent condition.

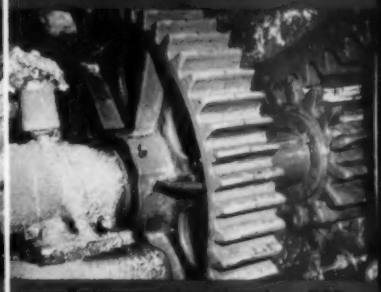


TSP gudgeons on screw conveyors deliver outstanding performance.



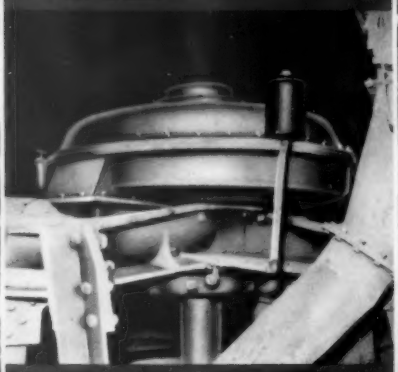
TSP main agitator drive pinion and intermediate drive bull gear after several years service.

TSP crane hoisting and cooling drums on overhead crane. Note smooth and true grooves on TSP drums.



Rotary cooler showing TSP drive pinions and intermediate drive bull gear after several years service.

Helical gear being cut on Tool Steel's big gear cutter.



TSP bevel gears and pinions on pulverizing mills.

TSP gearing on dryer.

# "WE CHOSE TIMKEN® CARBIDE INSERT BITS FOR CONSISTENT PERFORMANCE"

Special report from Channel Constructors

•

**LOCATION: Niagara Falls Power Project**

•

OPERATING CONDITIONS: Rock-Lockport Dolomite

Reports from the Niagara Power Project prove again that Timken® carbide insert bits give the most economical service. Timken bits were used in drilling the 500 ft. wide, 100 ft. deep cut shown at the right. Channel Constructors chose Timken carbide insert bits because of their consistent performance on the rock drilling phase of this project. Users of Timken bits everywhere report such savings — more feet-per-bit, longer bit life, fewer lost holes.

## Which Timken Bit should you use?

Your most economical bit for hard, abrasive ground is the Timken carbide insert bit. In softer ground, use the low-cost Timken all-steel multi-use bit. Because both bits are interchangeable in the same thread series you can switch bits when the ground changes. Dozens of different Timken bits fit the same drill steel. Both types are made from Timken electric furnace fine alloy steel, have special shoulder unions that protect threads against drilling impact. Let us help you select the Timken bit that will do the most economical job for you. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

**TIMKEN®**

**removable rock bits**

## Comprehensive Program Set for Annual Meeting Of S.M.E. of A.I.M.E.

One of the most comprehensive conventions programs ever scheduled by the Society of Mining Engineers (American Institute of Mining, Metallurgical, and Petroleum Engineers) has been set up for the A.I.M.E. annual meeting in St. Louis, February 26 through March 2. Technical sessions on 27 themes will be sponsored by the four S.M.E. divisions.

Sessions of the Industrial Minerals Division will cover the following topics: raw materials for chemical industries in the Midwest; transportation of bulky minerals; industrial waters; exploitation of industrial minerals; foreign trade aspects of fillers, fibers, and pigments; and mineral aggregates.

Sessions of the Minerals Beneficiation Division will cover the following topics: crushing and grinding; concentration; chemical processes; kinetics (symposium); materials handling and mill design; solid fluid separation; operation control; and pyrolysis and agglomeration.

The following topics are under consideration for sessions of the Mining and Exploration Division: geochemistry; geology; geophysics for geologists and engineers; open-pit mining; research (symposium); and underground mining. During this division's program, the Jackling Award will be presented and the Jackling lecture will be delivered.

New officers and directors of A.I.M.E. and its constitutent organizations will be installed during the convention. James C. Gray, Pittsburgh (U. S. Steel Corporation, administrative vice-president, raw materials) will become president of the Society of Mining Engineers for 1961. He will succeed Dr. Arthur B. Cummins, Bound Brook, N. J. (former manager of central research for Johns-Manville Co., Manville, N. J.).

---

CHARLES G. GROSVENOR JR. has been appointed by the Asphalt Institute to the post of district engineer at Santa Fe, N. M. He will provide engineering service for New Mexico and west Texas.

## Construction Cost Index Barely Tops Figure of 1959

Construction and building costs during 1960 showed the smallest 12-month increase since 1949, according to *Engineering New-Record*. The easing of the squeeze on the construction dollar was attributed to lower prices for lumber, stable (or lower) steel and cement prices, and limited success in shaving average annual wage increases.

The magazine's 20-city Construction Cost Index for December, 1960, stood at 830.61. This represents a 2.7 percent gain over December, 1959, compared with a jump of 4.3 percent from December, 1958, to December, 1959. The 20-city Building Cost Index, at 561.50, rose only 1.6 percent in the last 12 months. It was up 3.4 percent in the December 1958-1959 period. (1913 = 100 for both of the indexes.)

---

THOMAS C. MAYNE has been appointed to represent the Huron Portland Cement Company in northern Michigan.

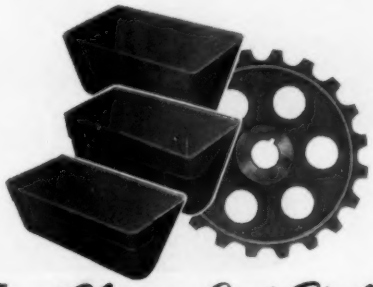

FARRELL-CHEEK ELEVATING and CONVEYING PARTS

"FOUNDRYMEN FOR OVER FIFTY YEARS"

FOR THE ECONOMIES OF TOP PERFORMANCE WITH MINIMUM MAINTENANCE AND DOWNTIME

*Industrial Chain and Pins, Buckets, Sprockets, Rollers and Wheels from electric furnace carbon and alloy cast steel. You receive great benefits from ordering all conveying and elevating parts from FARRELL-CHEEK.*

*They are designed and integrated to work together perfectly during a long life of dependable service.*



*You'll find the complete line of parts with specifications in Catalogs 21 and 23. WRITE FOR COPIES TODAY!*

FARRELL-CHEEK STEEL CO.
102 LANE STREET, SANDUSKY, OHIO

*Finest Name in Cast Steel!*

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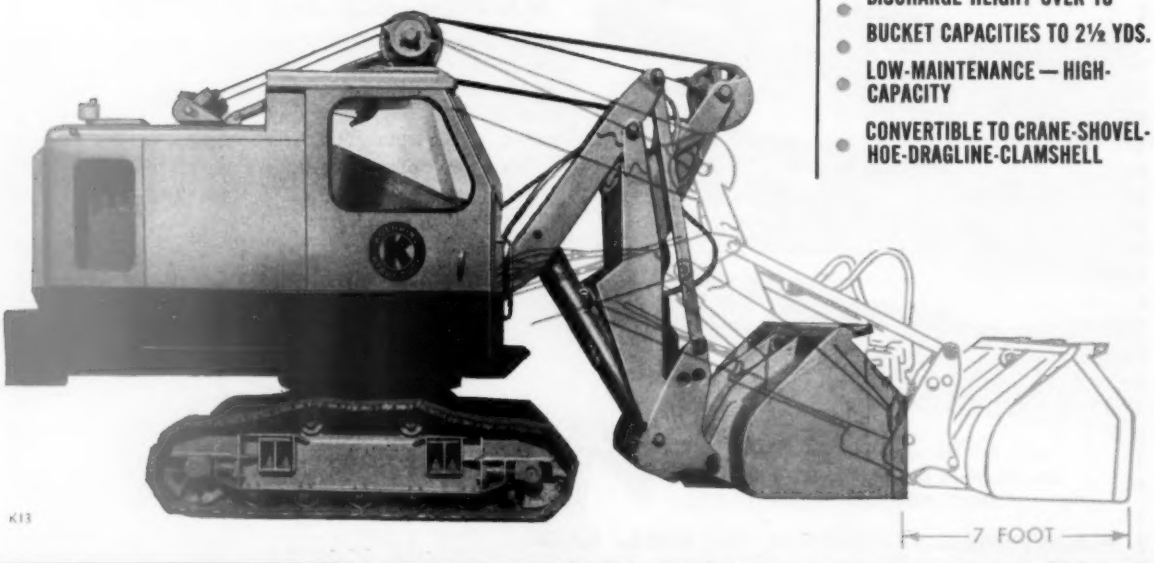
# "SKOOPER Increased

## Check these Skooper Features

- 7-FOOT LEVEL CROWD
- REVOLVES A FULL 360° FOR EASY LOADING
- DISCHARGE HEIGHT OVER 10′
- BUCKET CAPACITIES TO 2½ YDS.
- LOW-MAINTENANCE — HIGH-CAPACITY
- CONVERTIBLE TO CRANE-SHOVEL-HOE-DRAGLINE-CLAMSHELL




K13

# Our Production 52%"

*A report on the Koehring Skooper*

*by* W. C. Ratliff

*General Superintendent*
*Sunniland Lime Rock Company*
*Sunniland, Florida*

"I'D have bet a hundred dollars the Skooper couldn't do a job for us before seeing it in action. It has, though, and enabled us to increase production from 230 to 350 tons per hour — an increase of 52%.

We use the Skooper to load lime rock. We excavate this material below water, stock pile it for a month to get the water out, and then run it to a crusher. While drying, the rock has a tendency to set up, and becomes extremely hard to dig. This is where our Skooper has paid off."

**Skooper keeps four trucks busy, cuts maintenance**

"Before Skooper, we tried crawler-mounted end loaders, but maintenance was too high. We tried rubber-tired loaders, but they just couldn't dig the rock effectively. We then went to a 1-yd. dragline, but it was too cumbersome and slow — couldn't keep three trucks moving. With Skooper's 7′ level crowd and full-revolving swing, loading exceeds 350 tph. We now keep four trucks busy at all times and have time to use the Skooper to keep the haul road clean besides. Average loading time for a 7½ yd. dump truck is 55 seconds."

## Digs – Swings – Loads from a Standstill Position

**Check the Skooper yourself — check its fast cycling time, low-maintenance operation, and unique excavator-crane convertibility. See your Koehring distributor soon.**

*There's nothing like it — on wheels or tracks!*

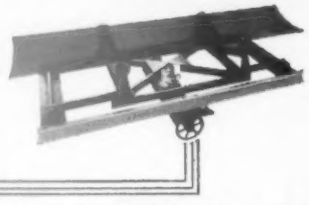
KOEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin

KOEHRING® SKOOPER

CONVEY
WEIGH and
CONTROL

your
product
with one
integrated
operation

Mechanize with
CON-O-WEIGH



The CON-O-WEIGH system can be installed as a simple weigh-belt mechanism or it can function as a process control system for conveyor-carried bulk materials. Equipped with variable-speed drive and an automatic speed compensation feature, CON-O-WEIGH is ideally adapted to complex feeding, blending and proportioning operations.

Its basic parts are simple . . . weigh section, load cell and control cabinet. Its application broad . . . records accurate running totals on loads of one to 5000 tons per hour.

The weigh bridge space requirements are small . . . can be adapted to existing or new installations.

Write for complete details.

Industrial
Physics &
Electronics
Company

470 So. 10th East - Salt Lake City 2, Utah
Phone DAvis 8-8678
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# British Sand and Gravel Firm Claims Aggregates from the Sea*

The "Sand Grebe" unloads a cargo for the screening plant at the Plymouth depot of the South Coast Sand and Ballast Company Ltd.

FOR many years, hydrographers have said that a vast stream of sand and gravel moves continuously from the west to east along the north side of the English Channel. In 1946, a company was formed with the object of using this source to extract concrete aggregates from the sea.

The first task of this company—the South Coast Sand and Ballast Company Ltd., a subsidiary of Wm. Cory and Son Ltd.—was to locate an area which could be regarded as a natural reservoir of material fed by the littoral drift.

A shoal area southwest of the Needles was proved for this purpose and for more than ten years an expanding fleet of vessels has been extracting material of a consistent quality without affecting the sea bed.

The principal advantage of winning aggregates in this way is that large quantities of material can be carried economically to all ports on the south coast of England.

Depots for marketing these aggregates have been developed and acquired at several south coast ports in Britain, where grading plants and other necessary equipment has been installed.

A screening and storage plant made by Frederick Parker Ltd., of Leicester, was erected in Southampton Docks in 1947. It is to be followed by a second at Leamouth Wharf, Southampton.

There are similar Parker plants at Twyford Wharf, Portsmouth, and Pottery Quay, Plymouth. A further plant for Southampton has just been purchased.

At Portsmouth, the material is unloaded from the ships and fed to an Oscillex horizontal, vibrating screen set above storage bins for 1½-, ¾-, ⅜- and 3/16-in. materials.

The plant grades about 40 to 50 cu. yd. an hour, and this material is used in local building operations and in the company's own ready-mixed concrete plants.

The Oscillex screen made by Parkers is a two-tray counterbalanced horizontal screen designed to handle large capacities. The two trays are independently mounted and the movement of each is opposed to the other to cancel out the forces set up by each tray.

To supply material for its plants, the South Coast Sand and Ballast Company Ltd. has built up a fleet of suction dredgers which are managed by an associate company.

The earlier vessels in service were converted coasters, but the latest were specially designed and built.

*Used by permission of *Cement Lime and Gravel.*

## Southern Materials Co. Wins $10 Million Contracts For Chesapeake Bay Bridge

Contracts totalling $10,000,000 for materials to be used in building the $200 million Chesapeake Bay bridge-tunnel have been awarded Southern Materials Company, Inc., Norfolk, Va. Materials required will include 1,700,000 tons of stone (1-in. pebbles to 15-ton boulders), which will be taken to the site from the Southern Materials quarry near Petersburg and from four other quarries in Virginia and the Carolinas.

In addition, the firm will provide 500,000 tons of sand and gravel and 550,000 cu. yd. of ready-mix for prestressed members and construction of bridge roadways. Deliveries of ready-mix from the company's Cape Charles plant have begun.

Additional capacity built and acquired during the last 18 months by Southern Materials will facilitate meeting these large production commitments.


**LOOK AHEAD!**

©1960, UPA PICTURES, INC.

**Mr. Magoo says you can't afford to be near-sighted about cancer. Too dangerous. Too much to lose. Maybe your life.**

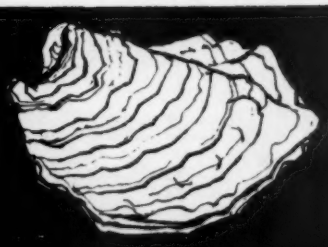
**Got to look ahead. Play it safe. Many cancers can be cured if detected early and treated promptly.**

**Be far-sighted. Have a health checkup every year. It could save your life.**

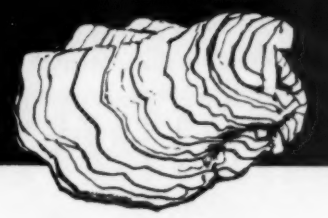
**AMERICAN CANCER SOCIETY**



which oyster



hides a pearl?



Each time he sinks to the floor of the sea the pearl diver is filled with hope . . . hope that one of the oysters he will send to the surface hides a priceless pearl.

Oysters and replacement parts for crushers, shovels and tractors have much in common, for there are replacement parts which hide values as priceless as pearls, values which can save thousands of dollars each year. And, as oysters must be opened to determine which will yield the pearl, replacement parts reveal their true qualities only in service.

This is why Columbia invites you to test its Armor-Tough manganese steel replacement parts . . . the best investment for crusher, shovel and tractor. Once you have tried Columbia Armor-Tough parts you will never use any other . . . because Columbia parts will do more work per dollar invested than any other make.

Ask your dealer about Columbia Armor-Tough replacement parts for crusher, tractor and shovel. Also send for Field Report No. 504. Read what users say.

Columbia

COLUMBIA STEEL CASTING CO., Inc.

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13 Empire Building • Pittsburgh, Pennsylvania

203 N. Highland Ave. • Los Angeles 38, Calif.

Boehomme Avenue • Clayton 5, Missouri

145 Clay Street • Denver, Colorado

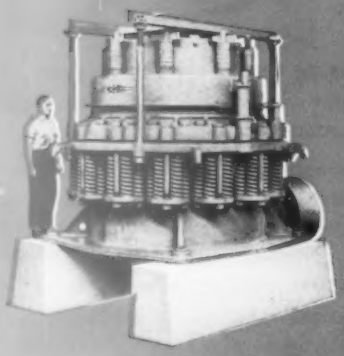
Enter 41 on card, page 183

## SYMONS® PRIMARY GYRATORY CRUSHERS

These gyratory crushers are built for big tonnage, heavy duty primary breaking in 30", 42", 48", 54", 60" and 72" feed opening sizes, for capacities up to 3500 or more tons per hour.

## SYMONS INTERMEDIATE CONE CRUSHERS

General duty machines for producing large quantities of product material with a minimum of fines, from fairly uniform feed, requiring a reduction of only one or two sizes. Available with 22" and 30" crushing heads, in capacities to 100 tons per hour.

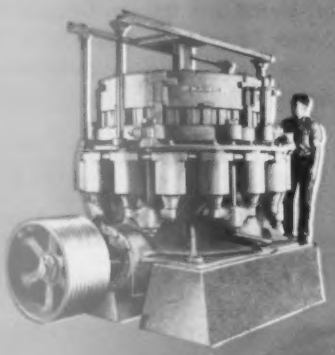


## SYMONS CONE CRUSHERS

For secondary and finer reductions, Symons Cone Crushers, in both Standard and Short Head types, are built in sizes ranging from 22" to 10' in diameter, for capacities from 6 to upwards of 1500 tons per hour per unit.

## NORDBERG GRINDING MILLS KILNS AND COOLERS

To meet specified conditions for wet or dry processing in the manufacture of cement and numerous other processes where friable material must be comminuted to fine sizes. Mills include Rod, Ball, Pebble, Tube and Compartment types in sizes from 6' to 13' diameter and up to 50' in length.



## NORDBERG GYRADISC® CRUSHERS

Built to supplement the world-renowned Symons Cone Crushers, the Nordberg Gyradisc provides a medium for the profitable production of sand sizes of specification material.

## NORDBERG ENGINES

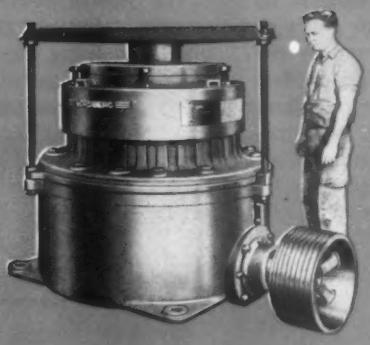
Ranging from small "packaged" power units to large stationary engines for base load and standby power, Nordberg engines are built in a wide range of types for Diesel, Duafuel® and Spark-Ignition Gas operation, in sizes to over 12,000 horsepower.

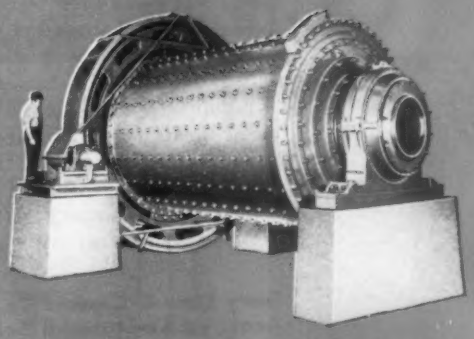
## IN PORTABLE PLANT SERVICE

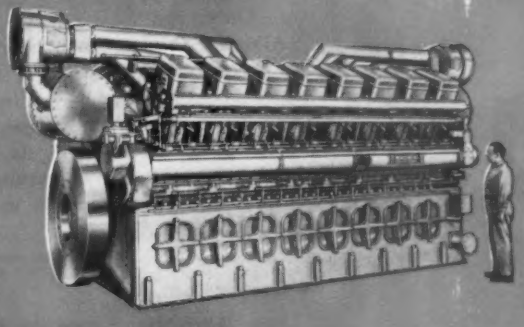
Increasing numbers of portable plant operators are now using Symons Cone Crushers for big capacity of fine product . . . such as this Cedarapids® portable intermediate crushing plant utilizing a 4' Symons Cone Crusher.

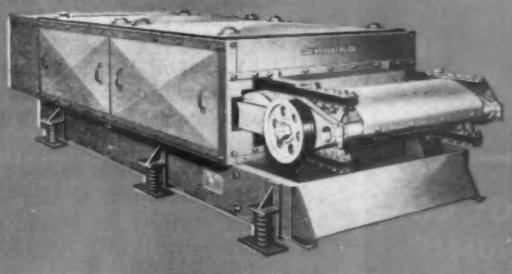
## SYMONS VIBRATING SCREENS AND GRIZZLIES

Built in a wide range of types and sizes to meet practically all sizing requirements from heavy duty primary scalping to many fine screening applications.









*For the Construction Projects of the World*

# NORDBERG MACHINERY

## produces BIG TONNAGES of Specification Aggregate Bituminous Materials Crushed Sand and Cement

NOW—more than ever before—as you plan production to meet steadily increasing demands for big tonnages of specification aggregate, bituminous materials, crushed sand, and cement—*your best buy is Nordberg.* Here is machinery that is used throughout the cement, aggregate and construction industries for maximum, continuous production at lowest possible cost.

With dependability proved through use, Nordberg machinery is on the job wherever in the world leading producers and contractors are engaged in the construction of highways, dams and hydro projects, bridges, as well as commercial and residential buildings.

Whether you are a contractor, operator, construction superintendent or design engineer, you will find it profitable to specify and use Nordberg Crushing, Screening and Grinding Machinery for stationary and/or portable service.

**NORDBERG MFG., Milwaukee 1, Wisconsin**

NORDBERG MACHINERY

*SYMONS . . . a registered Nordberg trademark known throughout the world.*

NORDBERG

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Q-158-R

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**Enter 42 on card, page 183**

### World Symposium Planned On Agglomeration Studies

Several hundred engineers, scientists, educators, and executives from many countries are expected to attend the first International Symposium on Agglomeration, to be held in the Sheraton Hotel, Philadelphia, April 12-14, 1961. Technical papers prepared by authors from the United States, Canada, Australia, South America, England, Scotland, Germany, Sweden, and Japan will be presented.

The program, outstanding in its scope, both as to contents and participants, will be sponsored by the American Institute of Mining, Metallurgical, and Petroleum Engineers and its three constituent organizations, the Society of Mining Engineers, The Metallurgical Society, and the Society of Petroleum Engineers.

According to A.I.M.E. headquarters, the entire program was designed to provide "cross-pollination" of thinking and doing.

The over-all theme is agglomeration in all phases of sintering, pelletizing, nodulizing, briquetting, powder metallurgy, and other aspects, as related to ferrous-non-ferrous-metallic and nonmetallic materials.

W. B. Stephenson, Paoli, Pa., is chairman of the general committee for the Symposium.

### 28-Ton Tractors Added To Riverside Cement Fleet

Riverside Cement Company, a division of American Cement Corporation, has purchased 18 new Kenworth conventional model replacement tractors. The vehicles, 14 2-axle 921's and four 3-axle 922's, were delivered through J. T. Jenkins Company, a Kenworth distributor with headquarters in Los Angeles.

Equipped with 220-hp. Cummins diesel engines and combined with new trailer trains, each of the Kenworth trucks is capable of hauling approximately 28 tons (150 bbl.) of portland cement per trip.

### Gary Lime & Cement Co. Acquired by Material Service

Material Service, a division of General Dynamics Corporation, has purchased the Gary Lime & Cement Co., Gary, Ind.

Material Service is a major Midwest producer of sand, gravel, stone, ready-mixed concrete, prestressed concrete beams, concrete pipe, and lightweight concrete aggregate. The company operates 35 distributing yards and producing plants in Illinois and Indiana.

### ● Correction

Ken R. White, consulting engineer, Denver, Colo., is responsible for the engineering and designing of the Seattle terminal of the Ideal Cement Company, not the Austin Company, as stated in page 23 of our November issue.

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LARRY ISBELL has been named Tulsa area sales representative for Oklahoma Cement Company, Tulsa. Mr. Isbell was an All-American football and baseball star at Baylor University. Until recently, he had been area sales manager for Inland Cement Company, Ltd., Edmonton, Alta., Canada.


*Save Time and Money!*

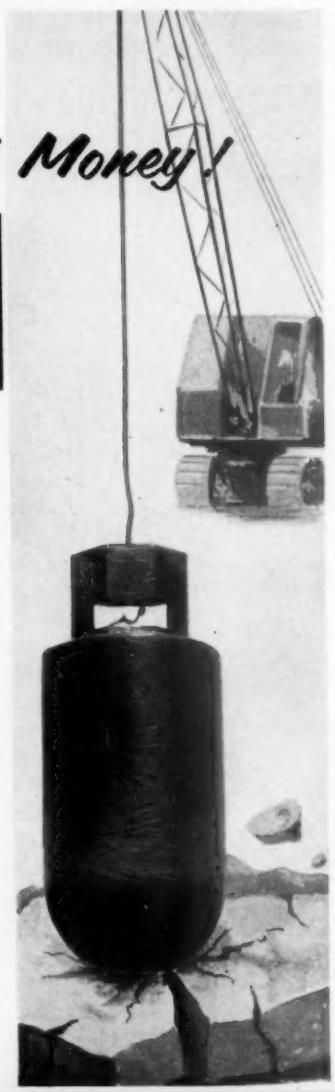
*use*
CAPE ANALLOY
FORGED
DROP BALL

unexcelled for "secondary breakage"

Save hundreds of dollars using CAPE ANN Drop Balls for "secondary breakage" . . . cut down expensive drilling and jack-hammering.

*Outstanding advantages . . .*

- Forged and heat treated.
- Tough, rugged, abrasion-resistant.
- Unparalleled for efficient production.
- Long, economical service.
- Sonic tested before shipment.
- Fully guaranteed.
- Available in sizes 2,000 to 12,000 lbs.



CAPE ANN ANCHOR & FORGE CO.
P.O. BOX 360 · GLOUCESTER · MASSACHUSETTS

Enter 44 on card, page 183

*product:*

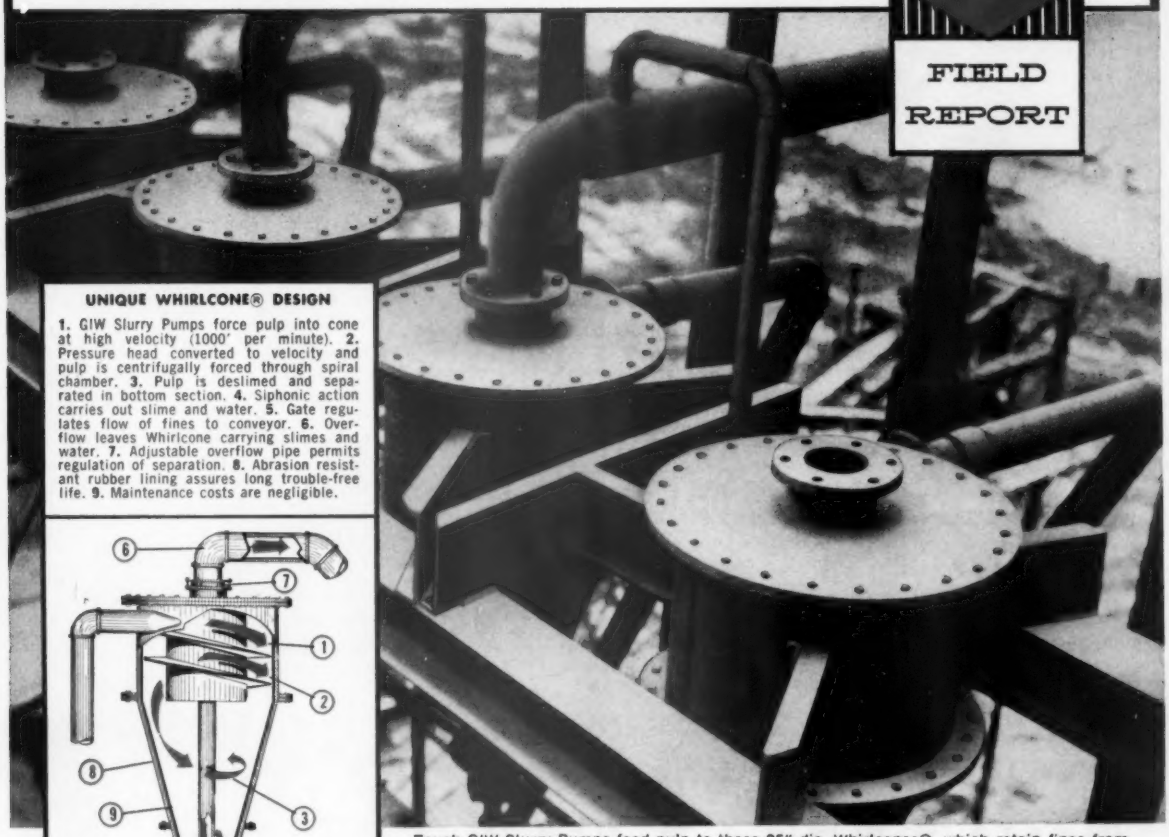
COTTRELL WHIRLCONE® SEPARATORS

*customer:*

BECKER COUNTY SAND & GRAVEL CO.

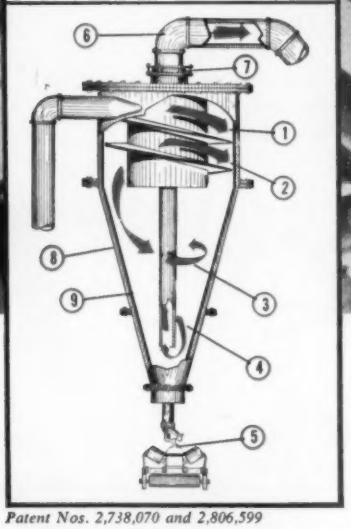
GIW

FIELD REPORT



**UNIQUE WHIRLCONE® DESIGN**

1. GIW Slurry Pumps force pulp into cone at high velocity (1000' per minute). 2. Pressure head converted to velocity and pulp is centrifugally forced through spiral chamber. 3. Pulp is deslimed and separated in bottom section. 4. Siphonic action carries out slime and water. 5. Gate regulates flow of fines to conveyor. 6. Overflow leaves Whirlcone carrying slimes and water. 7. Adjustable overflow pipe permits regulation of separation. 8. Abrasion resistant rubber lining assures long trouble-free life. 9. Maintenance costs are negligible.




*Patent Nos. 2,738,070 and 2,806,599*

Tough GIW Slurry Pumps feed pulp to these 25" dia. Whirlcones®, which retain fines from classifier overflow. Maximum recovery rate is 20 tons per hour per cyclone. The cones will handle material from −12 mesh to lightest slime.

# Whirlcone® Separators solve difficult fine recovery problems.

The retention of fines in the −50 plus 200 mesh range posed a disturbing problem for the Becker County Sand & Gravel Co., of Cheraw, S.C., primarily because the large amount of water used in processing the sand and gravel washed out the desirable fines with the minus 200 slimes.

Fourteen 25" dia. Whirlcone® wet type cyclones installed parallel in four Becker plants solved this problem completely. Operating an average of 8 hours daily, they extract up to 100 tons of clean, fine sand per hour from wash water while the minus 200 mesh slime is discarded.

Recovered fines are used to bring sand up to specifications. Thousands of tons of valuable sand, formerly lost, soon paid for the low cost of the Whirlcones®.

GIW's highly efficient Whirlcones® are also being used in the mining fields to deslime, degrit, classify, concentrate, make dam and mine backfill and to dewater or thicken where the overflow can be returned to the process or it can be discarded.

They are available in diameters from 6" to 50". Capital cost including the pump is 20 to 50% of conventional classifiers.

If you are losing fines from material −12 mesh to lightest slimes, write today. Recommendations and literature will be forwarded promptly.

COTTRELL ENGINEERING
Division of
GEORGIA IRON WORKS CO.

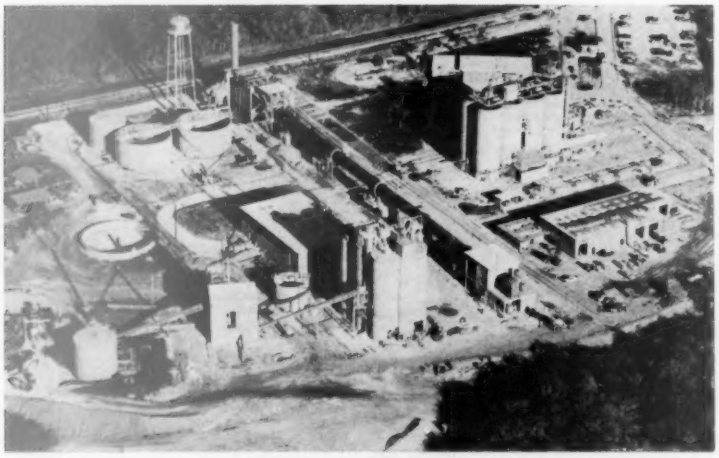
GIW

*Manufacturers of pumps, dredges, separators and accessories.*

AUGUSTA • GEORGIA



Enter 45 on card, page 183



Permanente's 1,700,000-bbl. plant, located on Oahu's leeward side, 28 miles from Honolulu. The facility was officially dedicated last August, with 2,000 persons present to witness the ceremonies and enjoy the family-style festivities.

At the dedication of Permanente Cement Company's Waianae plant in Hawaii these three important figures were present (left to right): Henry J. Kaiser, founder-chairman of Permanente; William Quinn, governor of Hawaii; and Wallace A. Marsh, Permanente president.

### Permanente's Hawaiian Plant Now in Full-Scale Operation

Permanente Cement Company's recently completed $13,000,000 plant at Waianae, on Oahu in the Hawaiian Islands, is now in full production. Coral limerock will be utilized as the basic raw material for making cement. Rated capacity is 1,700,000 bbl. per year.

With the completion of the plant, Permanente no longer needs its system of transporting bulk cement from its stateside operations. The firm's distribution facilities in Honolulu will be kept in full operation for shipping cement throughout Hawaii and other Pacific area markets.

---

A. J. CIPPARRONE, formerly assistant sales manager of Consolidated Rock Products Company, Los Angeles, has been named general sales head for the firm.

ROBERT G. HOLTON is now assistant sales manager, and ROBERT G. HENDREN has been appointed district manager.


Profit Producers prefer

HYDRASTROKE*

HEAVY-DUTY FEEDERS

Reciprocating Feeders to feed Screens, Crushers, Belts, Trucks, Skips or Railroad Cars.

- EXCLUSIVE HYDRAULIC OPERATION
  Designed for low installation, operation and maintenance costs.
- DESIGNED FOR SEVERE SHOCK LOADING
  Special rugged construction assures durability.
- ROCKER MOUNTING OR SUSPENSION
  Eliminates wear due to friction, needs no lubrication, takes minimum head room.
- WIDE RANGE OF SIZES
  Widths 36" to 96" . . . feeding capacities from 200 to 7500 tons per hour.

PATENT APPLIED FOR

NICO Write for Illustrated Brochures

*TRADEMARK REGISTERED

NATIONAL IRON COMPANY

50th Avenue West and Ramsey Street • Duluth 7, Minnesota

Subsidiary of Pettibone Mulliken Corporation, Chicago 51, Illinois

Enter 46 on card, page 183

# PRODUCTION – *NEW STRENGTH FOR SOUTH KOREA*

*Private enterprise is turning South Korea into an industrialized, highly productive country, to the benefit of all her people.*

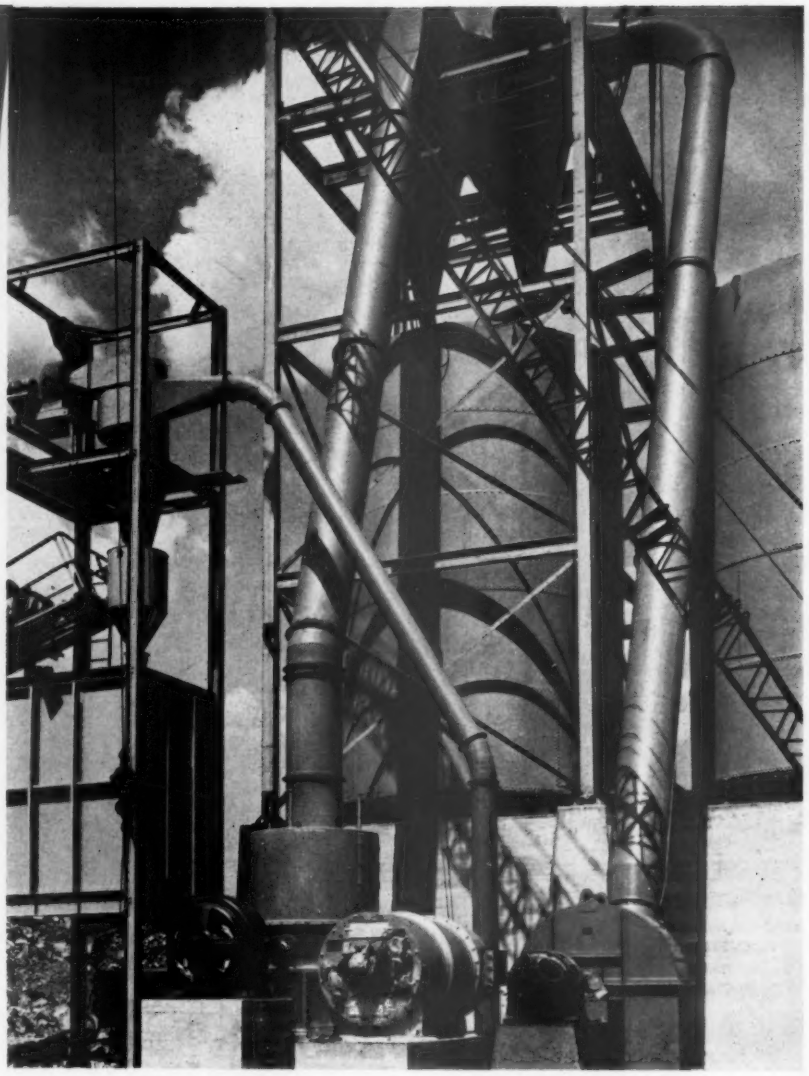
*This is exemplified by the Mungyong plant of Korea Cement Manufacturing Company, Ltd., which operates two F.L. Smidth rotary kilns, each 3.15 • 2.85 • 3.15 metres dia. x 123 metres long.*

*"MAGNECON" kiln liners, uniquely the product of Canadian Kilmar magnesite, are used in the hot zones of these kilns.*
*The "MAGNECON" liners contribute substantially to economy of operation by giving roughly five times the service life of previously-used refractories.*
*A recent report from Korea Cement, covering 335 days of service, concludes "The quality of 'MAGNECON' is superior and satisfactory."*

**CANADIAN REFRACTORIES LIMITED**
CANADA CEMENT BUILDING, MONTREAL, CANADA

**Write for technical folder " 'MAGNECON', the hot zone refractory to keep your kiln on the line".**

2318



BRADLEY EQUIPMENT

- MILL AND SEPARATOR
- HEATER FOR DRYING
  (by Todd Shipyards Corporation
- MILL FAN
- PRIMARY CYCLONE COLLECTORS
- VIBRATORY TYPE FEEDER
- FEED CONTROL
- DUCTING,
  Fan to Mill
  Mill to Cyclone Collectors
  Cyclone Collectors to Fan
  Vent to Secondary Collectors
  by Buell Engineering Co., Inc.
  Northern Blower Division

## 22 TONS-PER-HOUR AG-LIME AT 98% PASSING 20 MESH

Typical of Bradley work in the grinding field is this Pneumatic Hercules Mill installation at the Pine Creek Plant of Lycoming Silica Sand Company, Montoursville, Pa.

The installation takes Limestone of 2" maximum down to dust and containing, at times, as high as 10 to 12% moisture. The Bradley Mill System produces from this feed 22 tons-per-hour of finished material, with a fineness of 98.5% minus 20 mesh, 72 to 75% minus 100 mesh, containing approximately 1% moisture.

Bradley manufactures a full range of Pneumatic Mills with or without Flash Drying for finenesses up to 325 mesh . . . plus Bradley Hercules Screen-Type Mills to handle your semi-fine pulverizing requirements.

Bradley will test-grind your materials in their grinding facilities at Allentown, Pa. *without cost*. Write for details.

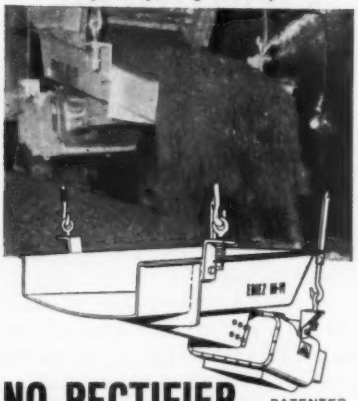
See Chemical Engineering Catalog or write for Bradley Catalog No. 63

**BRADLEY**
**PULVERIZER COMPANY** LONDON • **ALLENTOWN, PA.** • BOSTON

*Superior Grinding Equipment Since 1891*

ERIEZ *Magnetic Minute*

60 seconds that will help you improve operating efficiency.



# NO RECTIFIER NEEDED WITH ERIEZ HEAVY-DUTY VIBRATORY FEEDERS

PATENTED

AC powered Eriez Hi-Vi vibratory feeders move large tonnages of bulk materials with accurate control . . . more efficiently and economically. Illustration shows one of a number of Eriez units available for heavy feeding applications where **big capacity and accuracy** are essential.

Whatever your application, there is an Eriez electro-permanent magnetic feeder that will meet your exact needs. And you get this exclusive combination of advantages: No rectifier needed . . . AC operation. Totally enclosed drive element ideal for hazardous, dusty, wet and corrosive installations. New fibre glass springs assure superior performance and control . . . longer life because spring breakage is practically eliminated.

The full line of Eriez Hi-Vi vibratory feeders includes models with feeding capacities ranging from ounces to many tons per hour.

Write for descriptive bulletin to:

**ERIEZ MANUFACTURING CO.**
113NA Magnet Drive, Erie, Pa.

**MAGNA-THOUGHT**

Constant research, development and refinement are the keys to new and improved products. New and improved products are the keys to a company's growth.

A. F. ISRAELSON
Chief Engineer

ERIEZ

A GROWTH COMPANY . . .
10 NEW PRODUCTS IN THE LAST 5 YEARS

*Enter 49-A on card, page 183*

## American Cyanamid Co. Invests $2,000,000 For Pollution Control

American Cyanamid Company, Brewster, Fla., recently marked Cleaner Air Week by announcing plans which will increase expenditures for pollution control at its local plant by more than $2 million.

A recently completed phase of the operation is a giant chain mill and scrubber installation which will reduce fluorine emission from the firm's triple superphospate curing building. Construction is to begin soon on installation of dust collectors at the phosphate drying and grinding plants.

Arthur Crago, Cyanamid manager of phosphate operations, recently stated that the superphosphate operation will be tripled. By means of the installation of improved air pollution control equipment—even after expansion has been completed—the fluorides emitted to the atmosphere will be reduced more than 70 percent.

Construction will begin soon on dust collection facilities to go into operation in mid-1962. Included are an electrostatic precipitator for Cyanamid's phosphate drying plant and a cyclone collector for the grinding plant. These will capture about 90 percent of the dust.

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Lawrence Kittle, formerly president of Ash Grove Lime & Portland Cement Company, Kansas City, Mo., has retired from this post, effective December 31, 1960. Mr. Kittle was associated with Ash Grove for 42 years.

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A study to determine the allowable moisture content in bituminous concrete pavements is now underway as a part of the 10-point Quality Improvement Program of the National Bituminous Concrete Association.

---

At Speed, Ind., an addition to the clinker storage building was completed recently at the Louisville Cement Company's plant. Storage capacity has been increased by 46,000 bbl.

ERIEZ *Magnetic Minute*

60 seconds that will help you improve operating efficiency.

# How much will an ERIEZ PERMANENT MAGNETIC PULLEY save you?

Erium® powered Eriez magnetic pulleys save one firm $1200 a year by removing 50 pounds of tramp iron a week from coarse clay. They can save you as much—or more, depending on your application.

In addition to preventing machinery damage, Eriez permanent magnetic pulleys prevent fires and explosions; assure product quality.

The pulley illustrated is one of 192 sizes (up to 36″ diameter in any belt width) made by Eriez. **There is one for your exact application.** Two basic models are available: **Type AA,** ideal for separating small and medium tramp iron and fine ferrous contamination; **Type CR,** which performs best in removing large pieces of tramp iron.

All models are engineered and constructed to give you the finest in automatic separation. All are powered by Erium®—our exclusively-designed power source. Model for model, Eriez units give you the finest quality and consistency of magnetic strength.

For descriptive bulletin write to:

**ERIEZ MANUFACTURING CO.**
113NB Magnet Drive, Erie, Pa.

**MAGNA-THOUGHT**

We willingly share our design and application know-how to help our customers find new ways to improve their plant efficiency and product quality.

E. J. TENPAS
Supervisor,
Magnetic Engineering

ERIEZ

A GROWTH COMPANY . . .
10 NEW PRODUCTS IN THE LAST 5 YEARS

*Enter 49-B on card, page 183*

### Cement Handbook Offered In English Translation

An English edition of the *Cement Engineers' Handbook,* by Otto Labahn, has been issued. The book, originally published in German, has also been translated into Spanish and Italian.

In addition to the general introduction the book is divided into seven general subjects. Topics covered in detail under major headings include: quarrying the raw material, proportioning of raw material, proportioning of raw mixtures, choice of manufacturing process, preparation of raw materials, kilns, cement grinding mills, and dust extraction. All the information a cement engineer is likely to require in the course of his day-to-day duties is so organized that the information is universally applicable.

The book is available from Bauverlag G.m.b.H., Kleine Wilhelmstrasse 7, Wiesbaden, Western Germany. Price, $3.60.

**ROCK HUNGRY**

**Brunner & Lay Hole-Master**

Brunner & Lay Hole-Master bits bite in and chew out rock to give that extra margin of output that pays off in profits. But whatever your need for rock drilling—whether large, or small, diameter holes—Brunner & Lay can supply every tool, from chuck to muck.

Widely-proved Brunner & Lay drilling tools serve longer when used together. Serviced by a nation-wide chain of conversion shops. Technical assistance. Get the whole cost-saving story from our local dealer, or nearest plant. Ask for bulletin #559-13. Brunner & Lay, Inc., 9300 W. King St., Franklin Park, Ill. *Est.* 1882. Plants and conversion shops: Albuquerque, Asheville, Birmingham, Dallas, Long Island City, Los Angeles, Philadelphia, Sacramento, Seattle, Lachine, Que.

**Brunner & Lay** carbide ROK-BITS • DRILL RODS

INTRASET STEEL • COUPLINGS, ADAPTERS, SECTIONAL STEEL, STRIKING BARS • Standard, rope or HL-16, HL-17 threads • MOIL POINTS, CLAY SPADES, ASPHALT CUTTERS, etc.

***Enter 50 on card, page 183***


## Obituaries

PROFESSOR WALTER C. VOSS, 73, Massachusetts Institute of Technology, died early last November. He had had a serious heart attack a year and a half ago. His interest in research and architecture was considered by many in the industry to have achieved more for building lime than any other technologist in the last 30 years. He was a frequent speaker at National Lime Association conventions.

JOHN H. MCKERNAN, a plant superintendent for The New Haven Trap Rock Company, died at his home in Wallingford, Conn. He was 61 years old.

Mr. McKernan had been superintendent of the company's Wallingford plant since January, 1946. Prior to that he was assistant superintendent of the main plant at North Branford, Conn. He had been with the company for 45 years.

MAURICE BRADEN RIDENOUR, who was for many years sales manager of the North American Cement Corporation, New York, N. Y., died at his home in Hagerstown, Md., recently at the age of 68. He had been ill for several years.

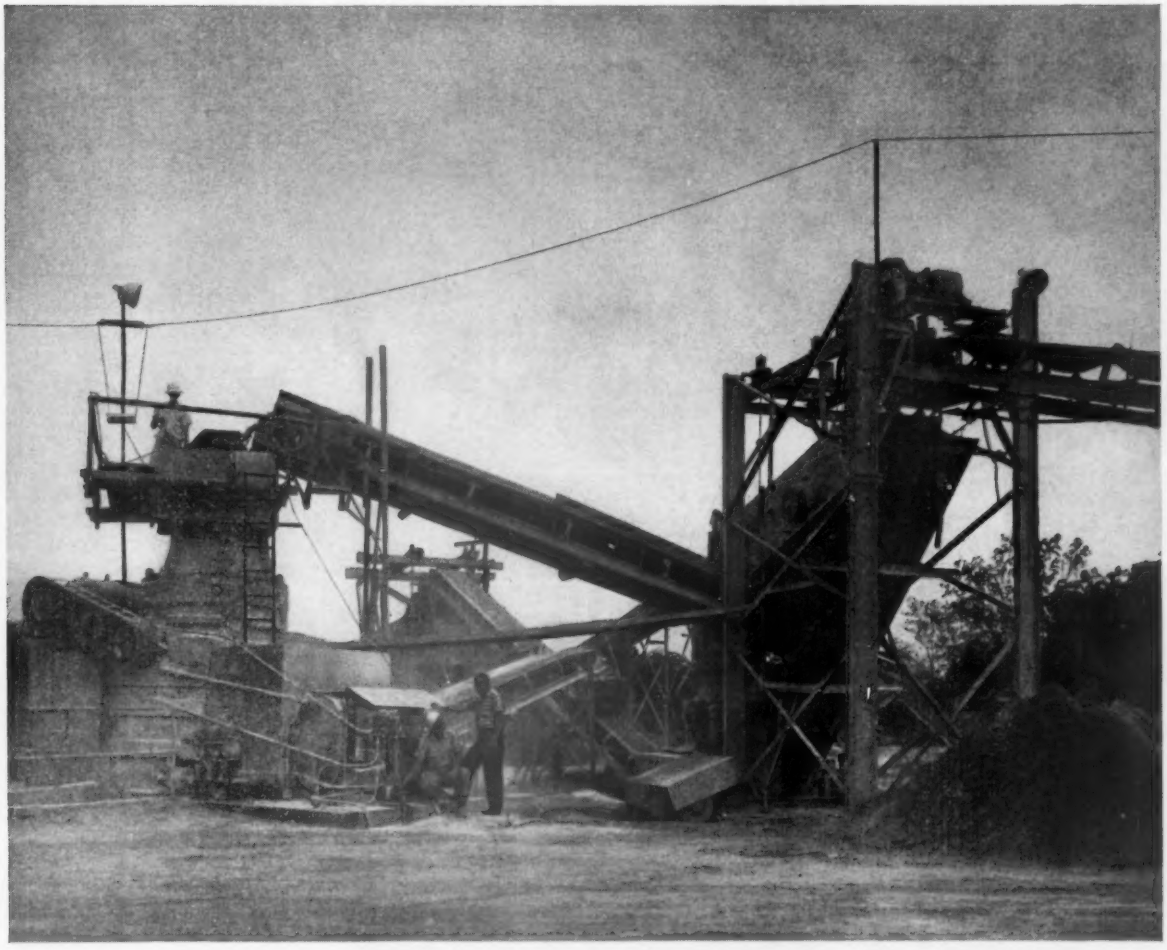
CHRIS K. OLSEN, 71, associated with the Lyman-Richey Sand and Gravel Corporation, Omaha, Nebr., for 50 years, died recently at his home in Valley, Nebr.

RAYMOND R. BEAR, a member of the board of directors of the Lehigh Cement Company, died recently. He had been associated with Lehigh for 50 years when he retired from active service in 1947.

Mr. Bear began his career with Lehigh in 1897 as a draftsman. He was made chief engineer, and in 1926 became vice-president of the company. In 1937 he was elected a member of the board of directors.

# ALLIS-CHALMERS

A-1345



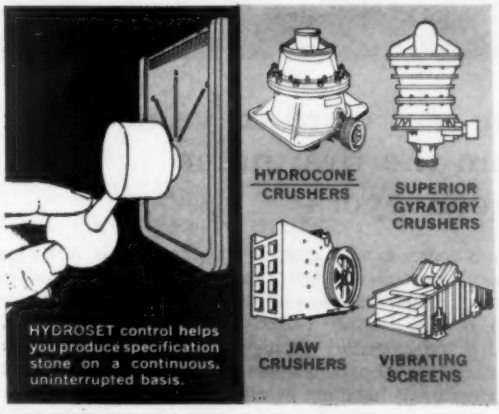
## Small switch brings big profits

### with Hydroset-controlled crushers paying extra dividends

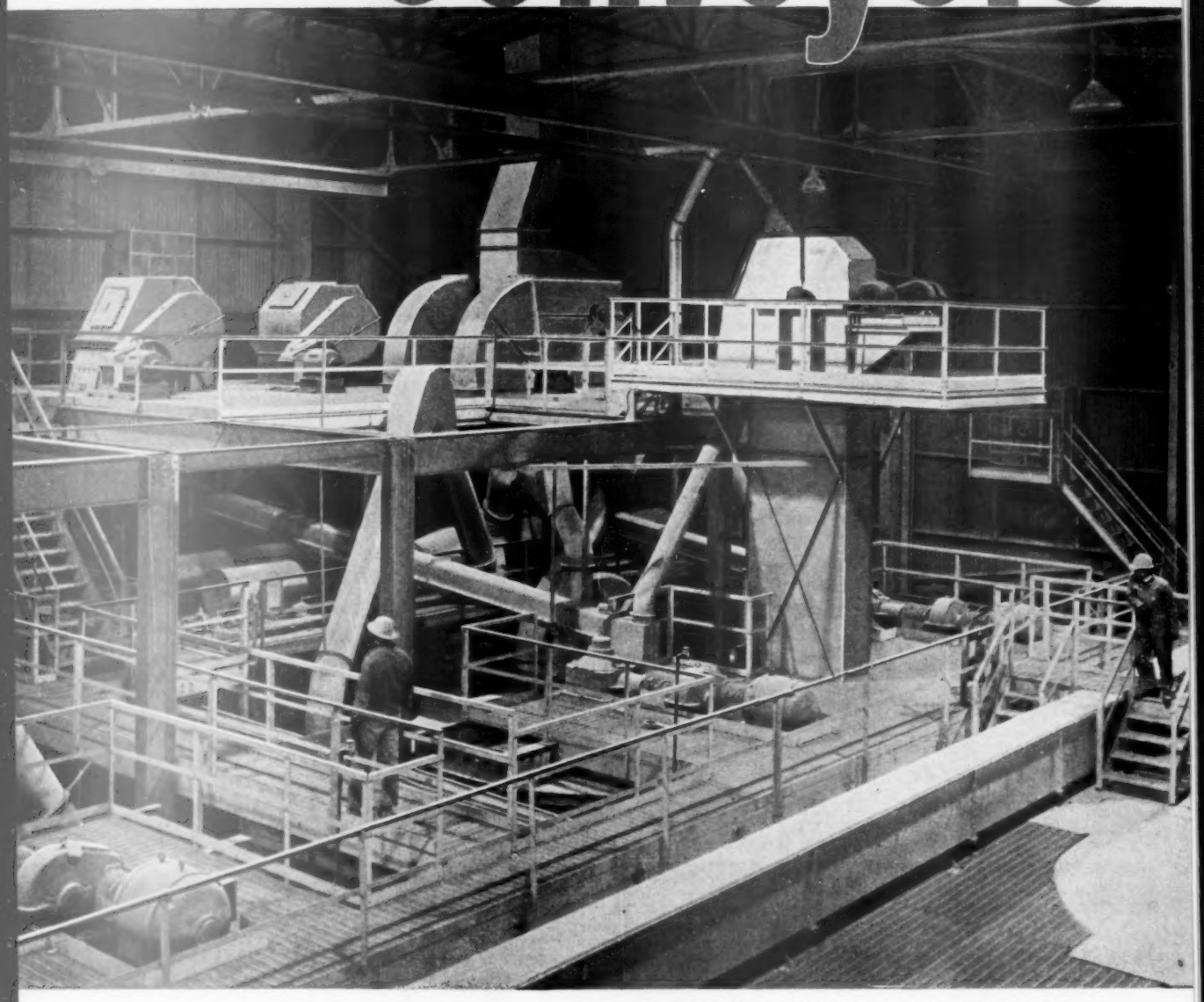
A shift in the crushed-stone market from 2½" topsize stone to 1" x 0 fines posed a problem for Aggregate Limestone Company, Trussville, Alabama.

To make the switch in production, they installed a 1051 *Hydrocone* crusher as a secondary unit, converted the existing *Hydrocone* secondary to third-stage crushing. This modest investment boosted production 60%, at the same time producing a more salable product.

And Aggregate Limestone Co. won't get caught with the wrong product size again. Their *Hydrocone* crushers are equipped with *Hydroset* control — providing easy adjustment for wear and quick change of product size, as often as necessary and on a minute's notice. Ask your A-C representative about the rugged dependability of *Hydrocone* crushers for reduction — and the product flexibility you get with *Hydroset* control. Or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wisconsin.


HYDROSET control helps you produce specification stone on a continuous, uninterrupted basis.
HYDROCONE CRUSHERS
SUPERIOR GYRATORY CRUSHERS
JAW CRUSHERS
VIBRATING SCREENS

# LINK-BELT conveyors



**BUCKET ELEVATORS**—Unlimited solutions to vertical or inclined movement of a wide variety of materials—bulk or parts. Fourteen types in four basic designs are fabricated from Link-Belt designed and integrated components—factory aligned for low-cost installation, smooth performance.

## The last word in value from the first name in conveyors

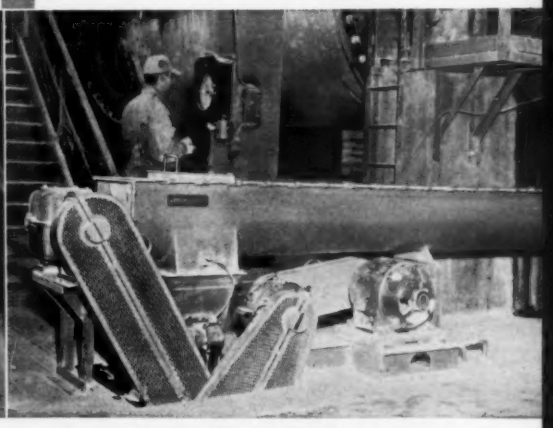
When it comes to your materials handling needs, it is a matter of sound economics to depend on Link-Belt, builders of industry's most complete conveyor line. In addition to this broad range of line, which permits unbiased recommendations, Link-Belt offers *quality*—achieved through engineering skills, manufacturing scope and research . . . *"experience unlimited"* in the materials handling field.

Also important, Link-Belt can provide *complete* handling systems . . . patterned exactly to your requirements with a background of more than 80 years of conveyor specialization. Our engineers are familiar with the particular handling needs of every industry. It's more than likely they have met—and solved—many problems similar to yours. We will design, equip and erect your entire installation . . . and accept full responsibility for its successful operation.

For full information—on single components or complete systems—large or small—contact your nearest Link-Belt office. Catalogs covering all conveyors are available on request.

# unlimited

**The line that means savings, whether handling raw materials, or finished products**

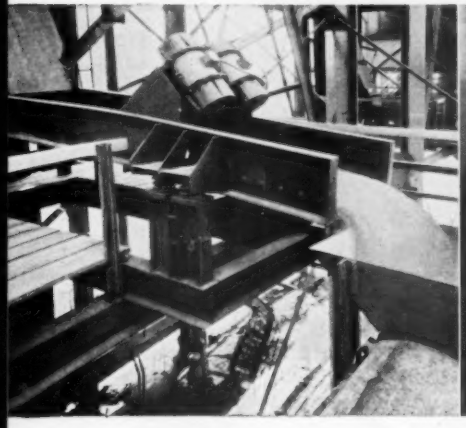


**BELT CONVEYORS**—Link-Belt serves as a single source for design, equipment and erection of *Job-Engineered* belt conveyors for small or large tonnages, for routes of any length. Link-Belt engineers have the selection advantage of industry's most comprehensive idler line—plus a broad range of pulleys, drives, terminal machinery and auxiliary equipment. Husky, *Pre-Bilt* sectional belt conveyors are also available from Link-Belt.

**SCREW CONVEYORS**—Operate horizontally, vertically or inclined. Link-Belt provides all components for a complete screw conveyor line. Exclusive optional *Quik-Link* feature permits fast, easy removal of any conveyor section without disturbing other components.

**FEEDERS**—Types for any capacity, any material. Link-Belt produces industry's broadest feeder line . . . belt, apron, reciprocating, screw, vibratory, bar, gravimetric and rotary types provide a uniform, controlled feed either mechanically, electrically or by weight.

**APRON CONVEYORS**—Wide application range provides efficient handling of sand, rock, gravel and many other materials. Materials are moved with a minimum of degradation over horizontal or inclined paths, or a combination of both. Jointed, overlapping or interlocking apron pans form the continuous carrying surface. Variety of chains, coordinated with pan design, matches the conveyor to your particular needs.



## LINK-BELT

**CONVEYING AND ELEVATING EQUIPMENT**

**LINK-BELT COMPANY:** Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,505

## Keeping production on the move in every industry

**Apron conveyors**
**Arm and tray elevators**
**Belt conveyors**
**Bucket elevators**
**Bucket elevators-conveyors**
**Bulk-Flo**
**Car-type conveyors**
**Chain conveyors**
**Circular carrier conveyors**
**Drag conveyors**
**Flight conveyors**
**Flite-Flow conveyors**
**Oscillating conveyors**
**Power-and-free conveyors**
**Pusher chain conveyors**
**Scraper conveyors**
**Screw conveyors**
**Sidekar-Karrier conveyors**
**Skip hoists**
**Slat conveyors**
**Trolley conveyors**
**Trukveyors**

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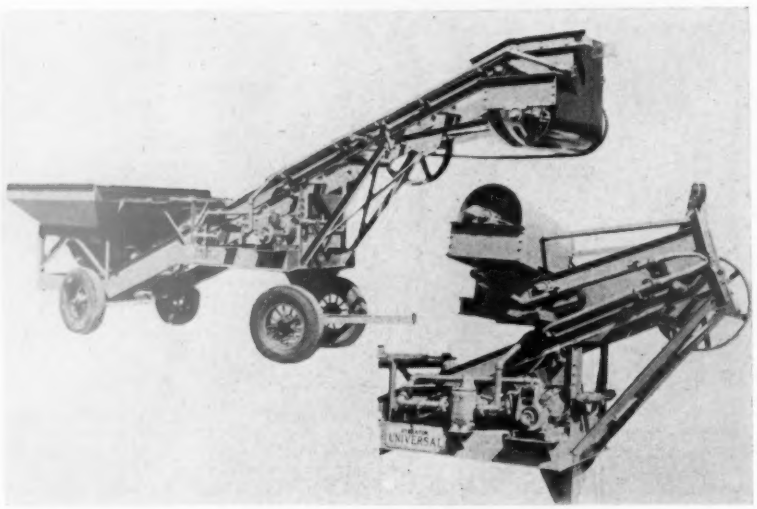
# new machinery



● A new stabilized base mix plant that includes pugmill, conveyor, bins, plus all piping and metering equipment, all mounted on wheels for portability, has been developed by Universal Engineering Corp.

The Universal portable "Thoro-Mix" has produced in capacities up to 500 t.p.h. of specification meeting material in field tests, according to the manufacturer. Mixing is in a confined self-lining tub with either twin or single shafts, depending on the requirements.

The pugmill, either twin or single shaft, is mounted at the end of a full 24-in. conveyor and at heights well above the truck dumping minimum. Accurate calibrated valve controls the metering of water to the spray bars; in addition to the calibrated valve, a measuring water meter is also supplied for positive control.

All equipment, including a centrifugal type pump, is mounted on the portable frame at operator's waist level. A quick action lever type valve controls water feed and permits quick shut off to avoid wet or putty spots in the compaction. (350)

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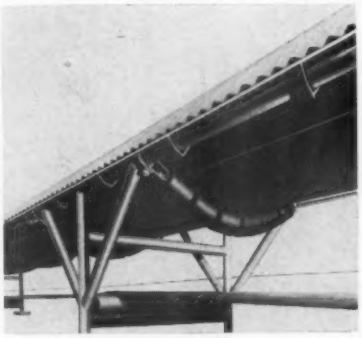
● Eagle Iron Works has introduced a new single input, double output shaft gear reducer drive for its line of double screw washers. This drive provides counter rotation of the screw shafts, with the advantage of being powered by a single motor, through a single set of V-belts. The single motor drive and positive gearing maintain proper, constant timing of the two screws for maximum output capacity.

Features of the unit are operating efficiency and low maintenance costs. The new drive will be standard equipment on all 36-in., 44-in., and 54-in. screw diameter Eagle fine material washer-classifier-dehydrators; and all 30-in. and 36-in. screw diameter coarse material washer-dewaterers. (351)

● The McNally Pittsburg cradle idler and belt conveyor is designed for versatility and sturdiness, with lightness of weight. The idler's rubber rollers, 5-in. in dia. and 5-in. long, are assembled on precision ground ball bearings. The number of rollers varies with the width of the belt—one roller for each 6-in. of belt width, plus one additional roller.

These individual rubber rollers are mounted on ⅜-in. stainless steel wire rope which is supported at each end by a simple ball joint attached to a v-clamp on wire rope, pipe stringer, or steel plate supports in the case of the replacement idler. This permits the belt to adjust itself to any profile.

McNally Pittsburg cradle idlers are fabricated to both 20-deg. and 30-deg. The 30-deg. idlers have a 12 percent greater carrying capacity than the 20-deg. idlers. All the conveyors are supported on H-frames



of 2-in. pipe; however, conveyors 36-in. wide and larger use 2-in. double strength pipe.

The idlers are adaptable to conventional type mounting and can be installed on trusses, structural members, plates, or other supports.

Self-aligning idlers can be installed at intervals when required on long conveyors.

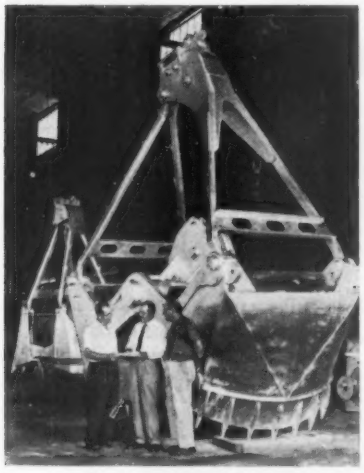
The manufacturer will make pre-engineered belt conveyors consisting of various lengths which are easily assembled at plant site. (352)

# and equipment

for further information use card on page 183

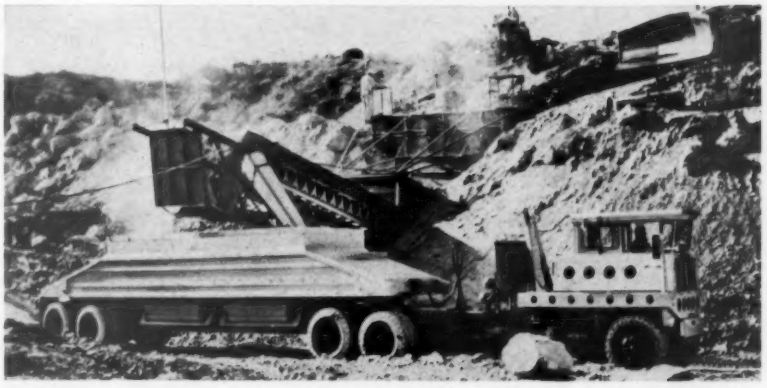
● Fabrication of what the manufacturer reports to be the largest clamshell bucket ever produced in the South has been completed by Yaun Manufacturing Company, Incorporated. It was built for Mall, Incorporated, an off-shore marine construction company presently operating three dredges in southern and southwestern Louisiana.

The "Big Bucket" weighing some 24,000 lb. is a 15-cu. yd., round-nose type that can handle 18-cu. yds. of material. It will be used as part of a 183 M Marion dragline and clamshell system on a new barge, soon to be placed in service by the Mall Company. (353)



● A new protective enclosure for preserving the effectiveness of detonating fuse by preventing water absorption in wet blast holes is offered by Austin Powder Company.

Known as Austin Plastic Fuse Enclosure, the manufacturer recommends the unit for sealing all fuse ends in bottom or top of wet holes, and reports its use is particularly important in bottom charges where water problems may affect final results. Watertight application is said to consist simply of pushing enclosure over fuse end. (354)

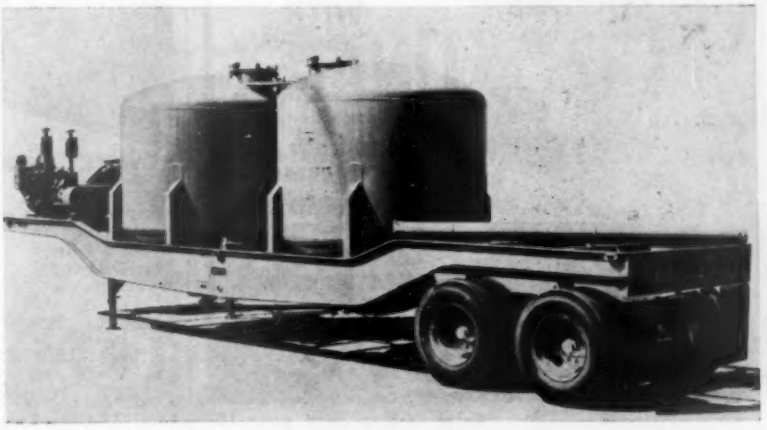


● The C-B Earthking, manufactured by Challenge-Cook Brothers, Incorporated, is a complete hauling unit, engineered for large earth moving projects, and featuring a fast load-travel-dump cycle.

The company reports the C-B Earthking with its rugged fast power unit hauls as much as 45-ton payloads over off-highway construction roads at speeds up to 52 m.p.h., and that the unit can dump on-the-move in less than 12 seconds. Air actuated bottom dump gates are operated by the driver from inside the cab. The Earthking can also be used to haul full legal payloads over the highway. (355)

● A new twin-tank dry bulk materials trailer equipped for self-unloading by air has been introduced by The Heil Company. The manufacturer reports that by use of a new pneumatic principle, the trailer unloads up to 4,000-lb. per min. through a 4-in. pipe.

The principle involves the use of high pressure with low air volume allowing the material to flow through the unloading pipe in a "hi-density" condition. Featuring light weight and simplicity of design, the clean bore vessels of the "Jet-25" discharge materials cleanly and completely. Vessels are quickly cleaned between product changes. (356)



# NEW PRIMER
## *for Ammonium Nitrate-Oil* BLASTING AGENT

Actual size — 3" diameter, 2" high
(Patent Applied For)

***NOW AVAILABLE***
***IMMEDIATE DELIVERY***

*WEST COAST OFFICE:*
4609 STAUNTON AVENUE
LOS ANGELES • ADAMS 2-6191

### in strip mine operations safe, sure, economical

The SAF-T-BOOST primer, Model No. 151, withstands unusually rugged treatment without detonating (a fact that will save many a shovel dipper). SAF-T-BOOST's high detonation velocity . . . *over 20,000 feet per second* . . . puts out power-plus for high-order detonation of ammonium nitrate-fuel oil blasting agents. Initiation is positive. SAF-T-BOOST is non-headache producing, non-freezing, and economical. Primacord sensitive only when threaded.

SAF-T-BOOST is normaliy used with 50-grain initiating cord down lines—yet lends itself readily to blast hole decking. *Write*

PROPELLEX

*CHEMICAL DIVISION CHROMALLOY CORPORATION*
P. O. BOX 187, EDWARDSVILLE, ILLINOIS
PHONE EDWARDSVILLE 3400

130-lb weight is swung against SAF-T-BOOST taped to a steel block. In over 100 tests, SAF-T-BOOST did not detonate.

30-lb. weight is dropped from height of 40 feet onto SAF-T-BOOST taped to steel plate. In this test, SAF-T-BOOST has never detonated.

SAF-T-BOOST is placed on wood excelsior and ignited. SAF-T-BOOST burns completely without detonating.

*Enter 56-A on card, page 183*

---

*Line* WITH **LINATEX**

(a specially processed rubber)
the most effective way to combat abrasion

CHUTES — LAUNDERS
HOPPERS — SKIPS
TABLE DECKS
CONVEYOR BELTS

*Write for free information*

**LINATEX CORP. OF AMERICA**
P.O. DRAWER "D", STAFFORD SPRINGS, CONN.

*Enter 56-B on card, page 183*

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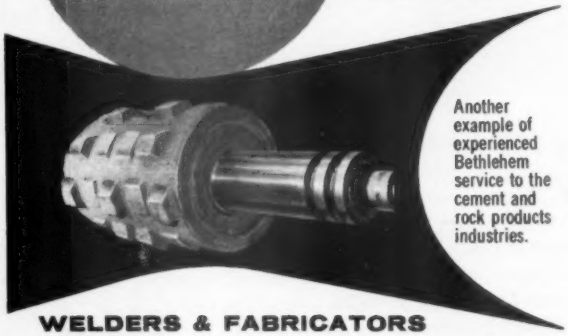
**CRUSHER ROLL AND SHAFT REBUILT BY BETHLEHEM***

with **WELD METAL**, re-machined & hard faced.



Another example of experienced Bethlehem service to the cement and rock products industries.

**WELDERS & FABRICATORS**

| | | |
|---|---|---|
| Complete Kiln Replacement Parts | Bushings | Feed Pipes |
| Agitator Parts | Conveyor Screws | Gears, Pinions |
| Babbitt Shells for Bearings | Couplings | Gear Housings |
| Base Plates | Drag Chain | Hammermill Parts |
| | Elevator Chain, Buckets, Casings | |

**CEMENT MILL MACHINERY DIV.**
*BETHLEHEM FOUNDRY AND MACHINE CO., BETHLEHEM, PENNA.
Est. 1856 Phone UNiversity 7-4605

*Enter 56-C on card, page 183*

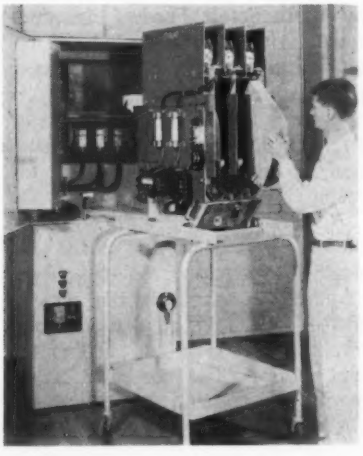
● Allis-Chalmers new concept in high voltage motor control, the "Space-Maker," is exactly one-half the size of previous models, yet with the same rating and capacity as its predecessors. The manufacturer reports the new controller includes the first starter in the 2,000 to 5,000 volt range to employ a two-high design for space saving, and the first completely drawout control on the market.

Space-Maker control features two full-voltage, high-capacity motor controllers, one above the other. Each can have a full rating of up to 1,750-hp. max. at 2,300 volts or 3,000-hp. max. at 4,000-5,000 volts. Each has interrupting capacity of 150 m.v.a. at 2,300 volts or 250 m.v.a. at 4,000-5,000 volts by use of current limiting fuses.

Heart of the new equipment is the 400 amp., 5 kv., 50 m.v.a. Type 456 air contactor using the new glass polyester flame-retardant, nontracking, Super Pyro-Shield insulation. Contactor size is reduced to only 28-in. high by 16-in. wide by 24-in. deep overall. The two-high cabinet net size is held to 36-in. wide, 32-in. deep, and 90-in. high.

The new drawout feature consists of a wheeled contactor carriage that carries contactor; main fuses in their supports; main disconnecting fingers; control transformers and control transformer primary and secondary fuses; and a two-pole, double-throw test circuit switch.

A simple racking mechanism enables the operator to easily and safely move the operating carriage from the operating position to the disconnecting position and return. (357)



When results are compared, Austin Apcomite proves to be more economical to use than on-the-job ammonium nitrate mixes. Besides producing greater explosive power per foot of loaded blast hole, it combines the low initial cost features of processed ammonium nitrates with the handling ease and controlled shooting of regular explosives.

Field tested for 3 years, Apcomite is ready for loading in vertical or horizontal holes—ready to shoot. Each tube has a primer in its nose . . . requires no special priming. Because it is always manufactured under the same uniform conditions, Apcomite can be used for controlled shooting not possible with on-the-job ammonium nitrate mixes.

**2 TYPES MEET ALL CONDITIONS**

Apcomite 17 and Apcomite 20A incorporate specially-processed ammonium nitrate packaged in 23G tubes of 5″ and larger diameters. While they are basically the same, No. 17 is for all normal usage while No. 20A, with its greater density, is for wet holes.

Austin also produces Austinite 15, a controlled ammonium nitrate mixture furnished in polyethylene-lined burlap bags. Likewise available in bulk bags of 50, 80 and 100 lbs.

**7 REASONS FOR USING APCOMITE**

- low final cost provided by greater explosive power per foot of loaded blast hole
- convenience . . . eliminates most shipping, storage, mixing and materials handling problems
- no special priming needed . . . primer in nose
- packaged in 23G tubes that are easy to handle and load
- uniformly manufactured . . . no chance of improper mixing
- permits controlled shooting
- adaptable to vertical or horizontal holes

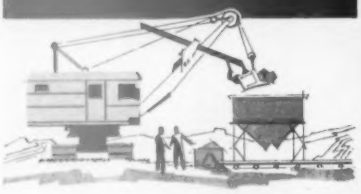
For complete details on how Apcomite can improve your operations, call your Austin representative today. A-401A

USED IN 1833 AUSTIN EVER SINCE

**AUSTIN**
**POWDER COMPANY**
CLEVELAND 13, OHIO

explosives ◆ ammonium nitrates ◆ primers ◆ detonating fuse
permissibles ◆ blasting supplies ◆ AP drill heads and bits ◆ mine tools
*Enter 57 on card, page 183*

# TRANSALL® Pre-Lubricated Idlers...



## Savings for the Quarry Industry

Transall pre-lubricated idlers are the product of years of experience in manufacturing belt conveyors for the quarry industry. Bearings of Transall Pre-Lubricated Conveyor Idlers are factory sealed — never require re-lubrication. More important, perhaps, there is no leaking grease to deteriorate your conveyor belt. Entry of abrasive dust, foreign matter, etc., is kept to a minimum to prevent destruction of bearings, the heart of an idler. **Result:** No lubricating costs, longer belt life, idlers last longer, maintenance costs less.

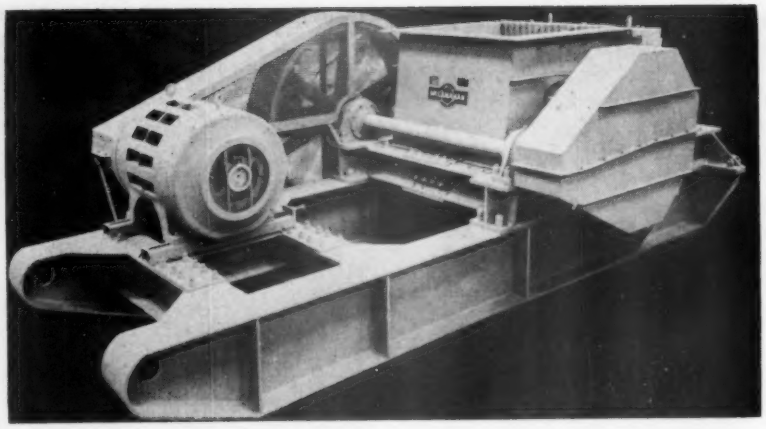
Idlers are available in 20°, 35° and 45° equal and unequal length rolls with various roll diameters and thickness of tubing wall.

We also manufacture complete pre-engineered sectional belt conveyor systems. Write or wire Transall Inc., 109 No. 11th, Birmingham, Alabama, for complete details.

**Perfectors of the Pre-Lubricated Idler**

**TRANSALL, INC.**
109 North 11th St. • P. O. Box 1588
BIRMINGHAM ALABAMA

*Enter 58 on card, page 183*

● A new skid-base crusher has been introduced by McLanahan and Stone Corporation. The unit includes a self-contained motor and a McLanahan Black Diamond Single Roll Crusher mounted on a heavy-duty, skid-type base.

The McLanahan unit illustrated includes a 22-ft. by 7-ft. skid, a 100-hp. motor, and a 36-in. by 48-in. fabricated Black Diamond Crusher. Design includes split frames on the crusher and skid to allow entry through very narrow vertical shafts. A chain-flight unit feeds the crusher, while crushed material is removed by a portable belt conveyor. **(358)**

---

● A new, continuous, in-process specific gravity measuring system designed for use with liquids, solutions, slurries, and suspensions has been developed by Weighing and Controls, Incorporated. Its output signals can be used for indication, recording, or control purposes.

In the system, a flexure-mounted W & C pneumatic weight transmitter, coupled with a specially designed stainless steel tank, continuously weighs a constant volume of a slurry or liquid. Since the weight of the constant volume is directly proportional to the specific gravity of the material, readout is directly in specific gravity units.

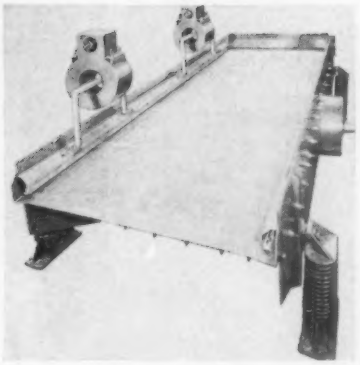
Volume is kept constant by one of two methods. If the material contains air, a probe and an air vent valve maintain the liquid level by venting the top of the tank, permitting a closed pressurized system. Liquids which do not contain entrained or dissolved air can be measured in a simpler, open-top, overflow tank.

In both tank designs turbulence can be introduced by baffles so that contained materials remain in suspension. It is also practical to attach a motor mixer to the tank for agitation.

Weighing and Controls, Inc. reports the system is accurate (better than 0.25 percent over-all), and gives excellent repeatability (1 part in 2,000). The pneumatic signal output gives flexibility and range; output pressure can be 3-15 p.s.i. or 5-40 p.s.i., read on a scale calibrated to 0.1 percent. The signal is essentially stepless, permitting smooth control. **(359)**

● A rotary bin activator that applies vibrating motion directly to the material and not to the bin walls containing it has been announced by Vibra Screw Feeders, Incorporated. Hermetically sealed and requiring no maintenance, the manufacturer reports the activator is applicable for any bin regardless of size, shape, or material of construction; and is especially adaptable for materials normally difficult to move.

Totally enclosed and noiseless, the bin activator may be moved vertically during operation to activate material throughout the bin, regardless of its length, so that vibrating impluses may reach all parts of the bin interior. The company claims the unit is economical to install and operate. **(360)**



● The Hanco Flux Power-electric screen heaters developed by F. R. Hannon & Sons conducts 0-4,000 amperes through the air.

This design principle eliminates replacements of flexible cables and leaf-type laminated conductors.

The unit is waterproof, dust-tight, 220/440/550 volt, and 3 phase on larger models, and features a five year guarantee. A hollow ventilated conductor bar transmits power from the heater unit to the screen and is so designed that it can be rigidly fastened to the screen frame. This bar passes through the opening or eye of the heater and picks up the power transmitted through the air, thus eliminating the need for an electro-mechanical connection.

Several types of screen cloth tensioning devices, depending on the material to be screened, are offered. The unit shown is a preassembled steel tensioning rail with a wedge-shaped conductor.

Also available is a full extruded rail where abrasive materials are not encountered.

Existing installations can be converted to this method of screen heating. **(361)**

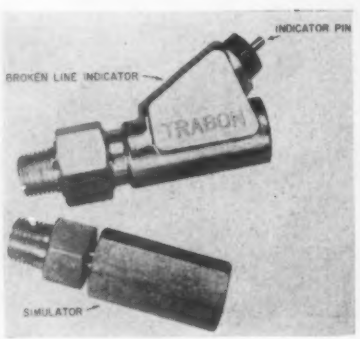
● A new, strutless track link providing a more even wear pattern and additional wear surface now is available for the TD-20 crawler made by International Harvester Company's Construction Equipment Division.

The link, replacing a strutted version, is plastic quenched, a hardening procedure where a solution of plastic material and water passes over the metal. The method gives flexibility to the hardening process of various patterns.

Ends of the strutless link have been rounded to be concentric with the track pin, so as to prevent interference with the track roller when the chain is bent in a reverse direction.

Because of the new link's enlarged center opening, there is no vertical strut interference. The opening permits the tracks to clean themselves, reducing the packing of material in the track chains.

The manufacturer reports that as a result, tracks run free, rolling resistance is decreased, top tractor performance develops, and that body strength is improved through adding more material at strategic points adjacent to the center opening. **(362)**




● The new broken line indicators manufactured by Trabon Engineering Corporation are all-hydraulic in operation. The device transmits a high pressure signal back to the pumping point providing immediate central warning of the broken bearing line.

When central warning is given via light, horn or other fault signal, it is a simple matter to locate the broken line.

An indicator pin, which normally protrudes from the indicator body, retracts—giving visual indication of the trouble spot.

Trabon Broken Line Indicators are designed for use with Trabon Type M and MX grease and oil systems and Type MO and MXO circulating oil systems. Indicator spring pressures are available to meet system pressure conditions, ranging from 400 p.s.i. for circulating oil to 1200 p.s.i. for large grease systems. **(363)**

**POKER?**
***Play to win!***

**How would you play these hands?**

In coming months we'll discuss how most "experts" (steady winners) would play the above hands in draw poker, jacks or better to open, 6 or 7 players in the game.

Every hand involves some basic principle of good poker playing. Simple rules, but ones which are most often violated by most good losers. Of course, following the rules is no guarantee you'll win. But, you should win more often.

Ford is not recommending that you gamble. But if you do play poker for money, chalk or marbles... or for that matter, just for the fun of it, you'll probably enjoy the game even more when winning.

In the same series, we'll be telling you of another way to win with Ford, and with no gamble at all: simply by using Ford tractors and equipment to help solve the problems of your job.

Next month, for instance, we'll announce a cash-money offer which so far as we know has never before been made in this field. Watch for it. It could be worth more to you... well, maybe more... than a royal flush!

**Tractor and Implement Div., Ford Motor Company, Birmingham, Michigan**

Ford
TRACTORS
EQUIPMENT

**Enter 59 on card, page 183**

*4½ yds, 262 hp provide new approach to basic quarry production problems*

# One machine replaces

The scene is Mississippi Lime Company's stone plant and quarry near Alton, Illinois. The machine is a Michigan Model 275A Tractor Shovel, with 22,000 lb lift capacity, 4½ yd bucket, 262 hp. Working both above *and* below ground, *it alone is doing the work of two swing shovels and two dozers.* The company's superintendent of operations explains some of the Michigan's assignments . . .

### Charges pug mill: 4,000 tons per day

Originally the pug mill was charged by two swing shovels and two crawler dozers (228 hp on tracks and 218 hp on rubber). Pushing stone out of stockpile to the swing shovels was slow, inefficient, took two to three hours overtime to achieve 4,000 ton per day production. A test was arranged in the hope that the Michigan's speed and 4½ yd bucket capacity could take over.

It did—and how!

The 262 hp Michigan Tractor Shovel today does the whole job alone in 8 hours, *without overtime.* Dozing is no longer necessary; the Michigan, with its 12′ 11″ clearance under bucket hinge, feeds direct into elevated hoppers.

### Does work of two swing shovels truckloading stockpiled stone

Other times, the Michigan handles truck-loading of stockpiled stone. Typical 18 yd semis are heaped in 4 passes, 2 minutes. Time is less than one-third that required by either of the two 1½ yd electric swing shovels formerly used for this operation.

About the only job left for the swing shovels, in fact, is loading out shot rock in the quarry. And the Tractor Shovel *can* handle this task. When it does, the costly operation of dozer cleanup is eliminated too.

Piling shot rock for loading, Michigan lifts and pushes material higher than could dozers previously used.

Typical load for Mississippi Lime's Michigan: 4½ yds of 2700 lb material. Note the two 1½ yd shovels, sidelined since the big Michigan took over this pug mill feeding job.

High dumping clearance, 12' 11", makes pug mill charging an easy job. Michigan feeds 4,000 tons of crushed limestone every 8 hours, has time to spare for other production jobs.

# the four "normally" needed

### Piles, cleans shot rock in underground quarry

By speeding these regular production jobs, Supt. E. M. Sipprelle finds the Model 275A has time for additional chores around the 250 acre plant area *and in the 35 acre underground quarry*. For example, a dozer was formerly used underground to push up shots. But the versatile Tractor Shovel piles stone higher—making loading out by swing shovels or the Michigan more efficient.

After loading, the 50 ft wide by 22 ft high quarry headings must be cleaned before the jumbo drill rigs can re-enter. The 28 mph Michigan runs over from stockpile or pug mill, cleans up, and is back on its original job in 35 minutes or less. Time spent *on the cleanup work alone* is less than half that formerly required by the crawler.

To all these production advantages, the Michigan has the added advantage of *greatly reduced maintenance*. Equipped with abrasion-resistant wide-base rock tires, all problems of costly track wear and repair have been eliminated.

### Buckets to 12 yds

We'd like to show you first-hand how a Michigan Tractor Shovel's power, speed and versatility can pay off on your job. Choose from nine models, with lifting capacities ranging from 2,900 to 29,000 lbs, then give us a call. We'll be glad to arrange a demonstration—at no cost to you and no obligation!

Michigan is a registered trademark of

**CLARK EQUIPMENT COMPANY**
**Construction Machinery Division**

CLARK® EQUIPMENT

2479 Pipestone Road
Benton Harbor 44, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

Enter 60 on card, page 183

● "Cyamon S" blasting agent and "Cyamon S" primer, two new explosives for use in seismograph exploration are now available from the Explosives and Mining Chemicals Department of American Cyanamid Company.

The new blasting agent is a nitro-carbo-nitrate that requires a primer for detonation. Packaged in hermetically sealed cylindrical containers, the manufacturer states that Cyamon S blasting agent has a moderate to high degree of resistance to water pressure and stands up well during storage.

Each of these cans is threaded to permit easy coupling for the forming of column loads. Depending upon the column length of the charge and the practice of the seismic "shooter," occasional booster primers may be added.

Cyamon S primer can be coupled to Cyanamid's new blasting agent through the threaded connections of its cylindrical metal package. The female end contains a recessed well for cap insertion that will accommodate any seismic cap now available.

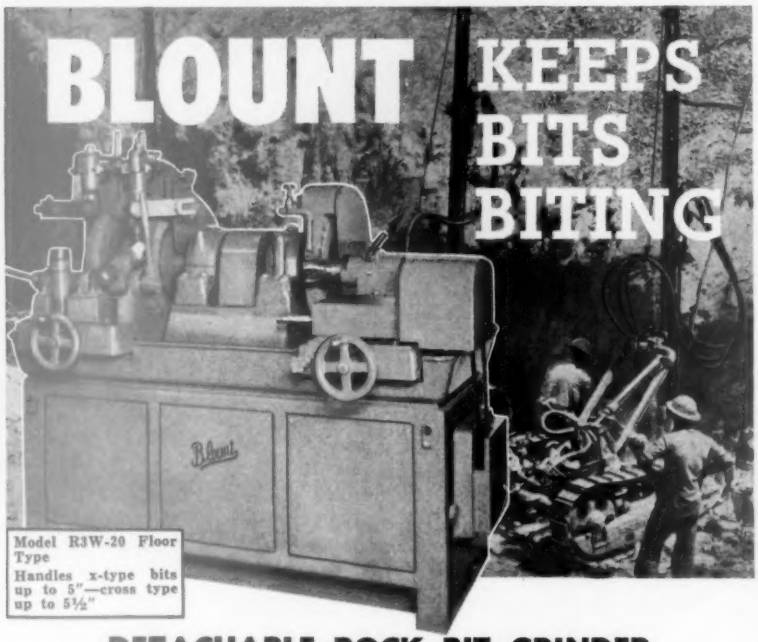
Cyamon S blasting agent is supplied in 2-in., 1 lb.; and 2½-in. 1 lb. blue metal containers. Cyamon S primer is packaged in red metal containers also available in the above size and weight containers. (364)

● Macwhyte Wire Rope Company has invented and applied for patents on a new, all-purpose wire rope to be marketed under the registered Macwhyte trade name "7-FLEX." This new wire rope is made of 7 strands instead of the conventional 6 or 8 strands.

The manufacturer reports it is designed to combine the best features of both 6 and 8 strand wire rope; it has an independent wire rope core. Features of the rope are abrasion resistance and bending fatigue resistance. Sizes manufactured at present are ½-in. to 1⅛-in., inclusive. According to Macwhyte Company, new sizes will be added as further needs arise. (365)

● The "Steel Protected Industrial Pneumatic" tire introduced by The B. F. Goodrich Company has two plies of steel cables imbedded in the rubber beneath the tread.

The manufacturer reports the tire to be practically invulnerable to most types of industrial debris. The tire, made with an all-purpose tread, is being produced in sizes to fit all popular materials handling equipment. (366)


Model R3W-20 Floor Type
Handles x-type bits up to 5"—cross type up to 5½"

**DETACHABLE ROCK BIT GRINDER CUTS DOWN-TIME – LENGTHENS BIT-LIFE**

BLOUNT machine-sharpens carbide-tipped rock drills far more accurately than any operator, however skilled, can by hand — and up to five times faster!

When you recondition your rock bits on a BLOUNT GRINDER, you can be sure of a uniform, symmetrical grinding job, including the exact angles the manufacturer intended.

Put a BLOUNT GRINDER to work for you, and get the savings so many customers report!

★ **Longer bit-life — more regrinds per bit**
★ **Faster drilling**
★ **Reduced drilling upkeep**
★ **Lower cost per foot of drilling**

**PARTIAL USER LIST**
***Blount Bit Grinders:***

Merritt Chapman & Scott Corp.
Morrison Knudsen Co.
Shea-Kaiser Morrison
Arch Dam Constructors
Litoria Mining Co.
Quebec Cartier Mining Co.
Jones & Laughlin Steel
Vulcanos do Brazil
National Asbestos Mines, Ltd. (Thelford Mines)
Central Electric do Furnas
Vulcan Materials Co.—Stockbridge Stone Co.

**J. G. BLOUNT Co.**
Everett 49, Massachusetts
Div. Bowl-Mor Co., Inc.

*Enter 62 on card, page 183*

# One bag broke . . . the other has two-way stretch

The one with stretch is made of H&W's new, high-strength Expanda Kraft.

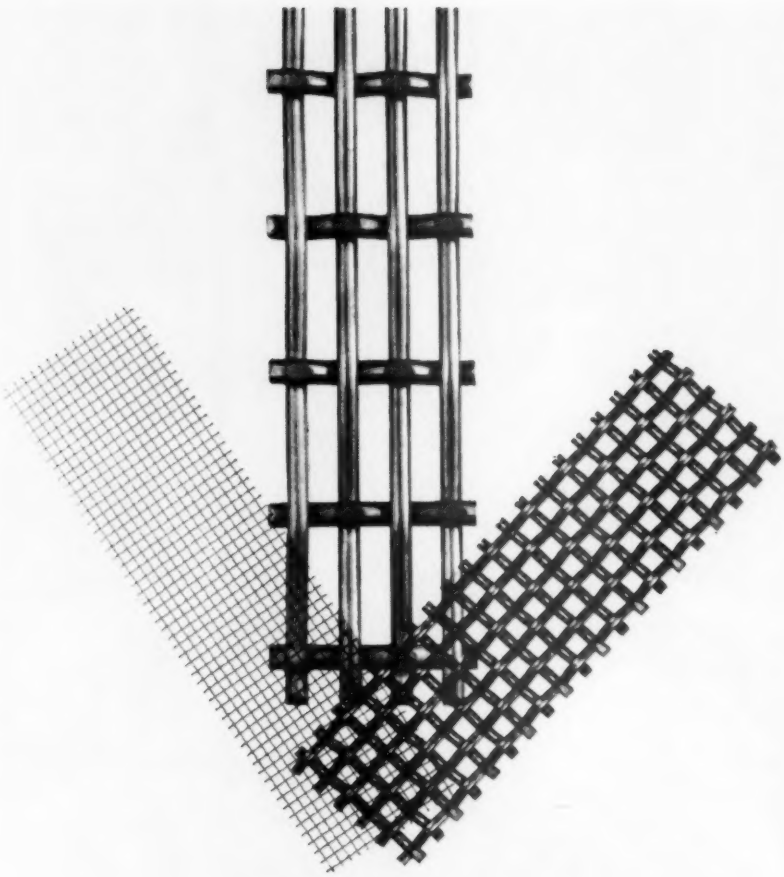
A large tractor-trailer ran over both bags of equal weight and plies. The regular kraft bag burst under pressure—see the tell-tale flour on the inside tire tread. But look at Expanda Kraft —*not a sign of breakage!*

Expanda Kraft is stronger, because it's made by a special roll-crepe process. It's resilient, has two-way stretch, and soaks up shock. And Expanda Kraft is available in white, semi-bleached and natural.

Expanda Kraft comes in 40, 50, 60, 70, 80 and 100-pound basis weights. *For samples and information*, write Hollingsworth & Whitney, Division of Scott Paper Company, Chester, Pa.

## Safeguard your product in **EXPANDA KRAFT®**

**HOLLINGSWORTH & WHITNEY** DIVISION OF
SCOTT PAPER COMPANY



TYLER

# HOW TYLER CUTS YOUR COST OF SCREENING

■ Your exact requirements matched from the world's broadest line of woven wire cloth . . . from the finest mesh for sifting and filtering to rugged alloy screens for heavy tonnage jobs. ■ Your time saved by fast shipments from the industry's largest inventory. ■ Proper application for best results assured by Tyler Technical Service, backed by the unique Tyler Customer Service Laboratory where screening problems can be answered by production-scale tests.

**THE W. S. TYLER COMPANY**
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OFFICES: Atlanta • Boston • Chicago • Dallas • Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City • San Francisco • The W. S. Tyler Company of Canada, Ltd., St. Catharines, Ontario • OFFICE: Montreal

● The patented Drott "4-in-1" buckets, offered on rubber-tired tractor-shovels by "Payloader" units, are now available for the largest and smallest models of the 4-wheel-drive line made by The Frank G. Hough Company.

Hough reports these Drott 4-in-1 buckets with their hydraulically adjusted jaws make it possible for a Payloader to do the following tasks: normal excavating and loading, bulldozing, clamshell pick-up, and scraping and grading. (367)

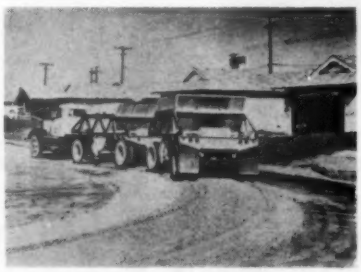
---

● A 4-ply kraft tape closure called "ImpacTape," which the manufacturer states doubles the impact resistance of sewn-end multiwall bags, has been developed by West Virginia Pulp and Paper Company. The new closure tape (pat. applied for) minimizes bag breakage at the sewing line, which reportedly accounts for 70 percent of all sewn multiwall bag failures.

The ImpacTape closure consists of a piece of kraft tape, the edges of which have been folded under the sewing line with the needle passing through four layers of the tape. In addition to the strength imparted by the four sewn tape plies, the inward fold of the tape further cushions the sewing line against sudden shock.

West Virginia Pulp & Paper indicates the development of the new tape closure stemmed from intensive studies of bag breakage carried out by the company when it introduced Clupak extensible paper as a new material for multiwall bags.

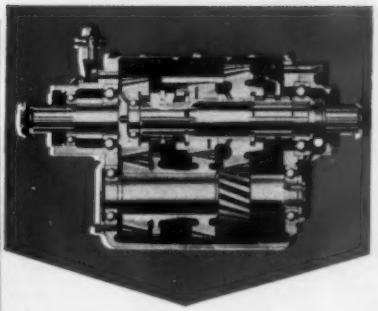
ImpacTape is now available on all closures made in West Virginia's bag plants. Testing of new modification equipment is now in the final stages. This equipment will make it possible for users to apply ImpacTape to sewn open mouth bags after filling. (368)



● Challenge-Cook Bros. Inc. have developed a new lightweight bottom dump train for full width spreading of aggregate and road base material. This spreader train is engineered for use with standard 2-axle tractors and will haul up to 28-ton legal payloads.

Vertical hopper sides, together with big 20-in. by 86-in. gates permit the driver to spread material full 8 ft. wide. Positive 2-way gate control from inside the truck cab (power opening and closing) provides precision control of material to uniform desired depth while the train is on the move. The manufacturer reports that blading is eliminated except for final pass.

C-B spreader trains are made in two models, identical in design except that in one model, special alloy aluminum instead of lightweight, high tensile steel is used in the hopper. (369)

*Specify*

**FULLER**

*Specify the*

**MODEL**

*For heavy duty trucks and tractors specify the*

**FULLER '92 SERIES**

**3-SPEED AUXILIARY**

- **High capacity**
- **Widest range of ratios**
- **Top-mounted power take-off optional**
- **Low initial cost, reduced maintenance**
- **Available from all truck manufacturers on specification**

**92 SERIES (Heavy-Duty) RATIOS**

| | SPLITTER RATIOS | | DEEP REDUCTION |
|---|---|---|---|
| MODEL | High | Intermediate | Low |
| 3-A-92 | .74 | 1.00 | 2.09 |
| 3-B-92 | .84 | 1.00 | 1.24 |
| 3-C-92 | .75 | 1.00 | 2.64 |
| 3-D-92 | .75 | 1.00 | 1.24 |
| 3-E-92 | .84 | 1.00 | 2.09 |
| 3-F-92 | .84 | 1.00 | 2.64 |
| 3-G-92 | 1.00 | 1.327 | 2.09 |
| 3-H-92 | 1.00 | 1.327 | 2.64 |

*Specify*

*Specify the MODEL*

**FULLER TRANSMISSION DIVISION**

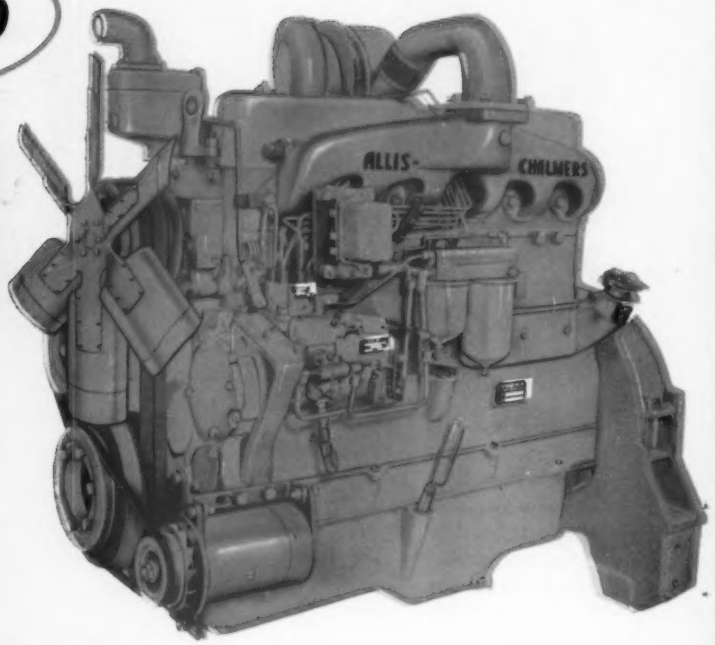
**EATON MANUFACTURING COMPANY**

KALAMAZOO, MICHIGAN

*Enter 65 on card, page 183*

**11000**

210 hp at 2200 rpm
(Turbocharged)




# NOW

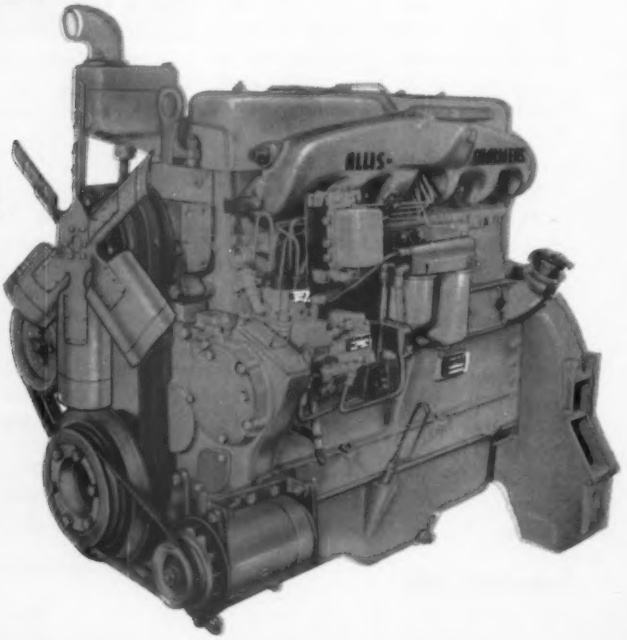
## A NEW KIND OF DIESEL

## WORK POWER

*in the 145-210 hp range*

**10000**

145 hp at 2200 rpm



Nowhere is there anything like these two great new Allis-Chalmers diesels—nothing compares with them in their range!

**Real Work Power** — The 210 hp in the turbocharged 11000 and 145 hp in the 10000 is down-to-earth power you can use — *work* power to operate smoothly under extreme load conditions.

**High, Sustained Torque** gives you work power throughout the entire operating speed range — power that really hangs on.

**Great Fuel Economy** — These new diesels have a unique combustion system that thoroughly mixes fuel and air for complete combustion. These engines run so efficiently that they work *extra hours every day* on the same amount of fuel used by other diesels in their range.

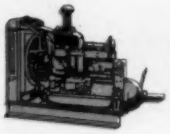
**Clean Exhaust** is another result of efficient fuel utilization in the 11000 and 10000 diesels. Fuel goes *out* in horsepower—not *up* in smoke!

**Fastest Starting** diesels in their class. They start without ether or pre-heating, even in freezing temperatures.

Find out more about what this new kind of work power can do for *you*. See your Allis-Chalmers dealer. Ask for new Bulletin BU-718.

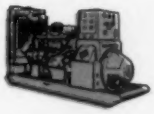
**Available in all these models**

ENGINES



OPEN POWER UNITS

CLOSED POWER UNITS



GENERATING SETS

MARINE DIESELS

TORQUE CONVERTER UNITS

OFF-HIGHWAY VEHICLE ENGINES

# ALLIS-CHALMERS

***POWER* FOR A GROWING WORLD**

11000 AND 10000 JOIN THE A-C ALLIS-CHALMERS TEAM OF MODERN DIESEL POWER

BE-22

● Two completely new rear dumpers engineered for the heavy-duty requirements of the quarrying and mining industries were introduced by Mack Trucks, Incorporated, at the American Mining Congress Show in October. They are the M-45SX, a 45-ton, 6-wheel unit, and the M-30X, a 4-wheel vehicle. These are the first two trucks in the company's newly created "M" series.

The M-45SX succeeds Mack's LYSW model and offers many of its proven features. Powered by a 450 hp. diesel engine, this 4-wheel drive unit has an 8-speed overgear transmission and air-assist clutch or optional torque converter drive.

Positive braking control, regardless of load, is provided by front air brakes and rear air - hydraulic brakes. Brakes for each of the bogie wheels are powered by separate air and hydraulic cylinders to prevent complete loss of braking power in the event of failure at one wheel. Each pair of cylinders is mounted in the frame for maximum protection.

Other standard features of the M-45SX include: Mack's balanced bogie with power divider, power steering, 18:00 by 25 tubeless 24-ply tires on 13:00 rims, and Mack 50 hp. power takeoff. Cab features include: a new offset cab providing a commanding view fore and aft; new reverse-slope windshield, reducing glare and reflection; piano hinged doors; grouped instruments for quick reading, and double vents for driver comfort.

The 320 -hp., 30 - ton, M - 30X model, incorporates many of the engineering and design features of the larger 45-ton companion. The backbone of these new M models is an all-welded special alloy steel frame of wide flange I-beam construction. (370)


**MEMBERS**

**of the NSGA and NRMCA Conventions in MIAMI, JANUARY 23 to 26 and the NCMA, in DETROIT, JANUARY 30 to FEBRUARY 2.**

*All are Invited to stop at*

**DONALD SHEPHERD AND COMPANY INC.**

We will be at both conventions with our staff to talk with any member about the important part played by the various insurance plans made effective through the associations. The four plans include:

1. **Comprehensive Group Insurance Plan**
2. **Retirement Plan**
3. **Long Term Disability Plan**
4. **Executive Consultation Services**

**Telephone GRanite 9-6207**
**1400 Hancock Street Quincy 69, Mass.**

***Enter 68 on card, page 183***


● SKF Industries, Incorporated has developed a bearing damage detector employing a unique electronic system for accurate inspection without need to disassemble bearings. SKF reports the device, three years in development, has a sensitivity that can discover flaws no deeper than ten millionths of an inch.

The detector's operation is based on characteristic differences in the vibration pattern made by a damaged bearing and an undamaged bearing. Defects on races or rolling elements produce vibration peaks. These are superimposed on random vibrations generated by undamaged rolling surfaces. The detector functions by distinguishing these peaks from the vibration produced by the undamaged portions of the bearing.

According to the manufacturer, the instrument is rugged and simple enough for use in production or maintenance control by one operator, can check a bearing every 60 seconds, and distinguish between damage of the rolling elements and the inner and outer rings. (371)




***Enter 69 on card, page 183*** →

**"ReoMatics save 6½¢ per mile for Arizona Sand & Rock,"** reports Ralph Greer, Equipment Superintendent.

On a fleet-wide basis with each unit averaging 20,000 miles per year, Arizona Sand & Rock pares its operating costs by **6½¢ per mile through the use of automatics over straight sticks**. ASR's Reo dumps and mixers are equipped with **Reo Gold Comet Engines and ReoMatic transmissions**. Prime reason for ASR's standardization on automatics is to relieve costly shock load damage to drive lines and speed up delivery service to customers.

REO DIVISION, The White Motor Company, Lansing, Michigan.

*Gold Standard of Values*

# REO LIFETIME POWER

## Every Engine in the Line Wet Sleeve Constructed

The engine is the heart of the truck, and no truck can be better than its engine. Horsepower, type of fuel, ease and cost of maintenance, performing ability and suitability are important factors to every trucker's profits.

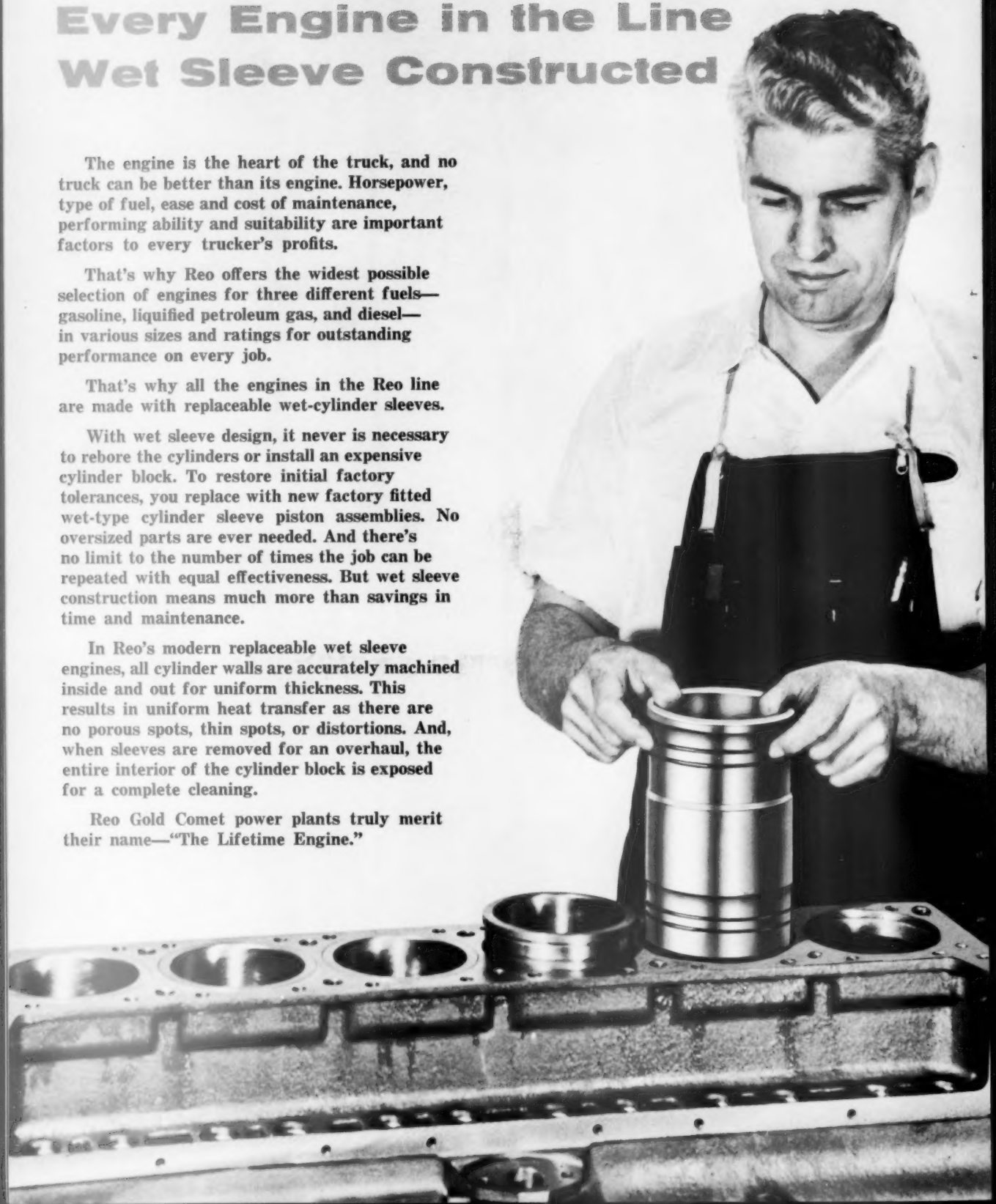
That's why Reo offers the widest possible selection of engines for three different fuels—gasoline, liquified petroleum gas, and diesel—in various sizes and ratings for outstanding performance on every job.

That's why all the engines in the Reo line are made with replaceable wet-cylinder sleeves.

With wet sleeve design, it never is necessary to rebore the cylinders or install an expensive cylinder block. To restore initial factory tolerances, you replace with new factory fitted wet-type cylinder sleeve piston assemblies. No oversized parts are ever needed. And there's no limit to the number of times the job can be repeated with equal effectiveness. But wet sleeve construction means much more than savings in time and maintenance.

In Reo's modern replaceable wet sleeve engines, all cylinder walls are accurately machined inside and out for uniform thickness. This results in uniform heat transfer as there are no porous spots, thin spots, or distortions. And, when sleeves are removed for an overhaul, the entire interior of the cylinder block is exposed for a complete cleaning.

Reo Gold Comet power plants truly merit their name—"The Lifetime Engine."



# Industry Personalities

R. E. Haskins

R. E. HASKINS was recently appointed to the post of vice-president of production and named to the board of directors of the British Columbia Cement Company, Limited, Vancouver, B. C.

Mr. Haskins joined the company in 1945, and until recently served as plant superintendent. During the last ten years under Mr. Haskins' direction, the Bamberton (B. C.) cement plant has been completely remodernized and expanded.

WILLIAM DONALD has been appointed to the position of sales manager for the northern division of Southern Pacific Milling Company, a major producer of basic building materials in coastal California. He will headquarter in Santa Maria, being in charge of the firm's seven northernmost branches. He was recently in the ready-mix business in Santa Maria; prior to that, he was general sales manager for San Gabriel Ready-Mix Company.

F. Naumetz

FREDERICK NAUMETZ has been named sales manager of Phoenix Cement Company. He has been executive vice-president of the Phoenix Association of Home Builders for the last three years. The appointment was made to prepare for the company's 40 percent expansion of capacity at the Clarkdale plant, which will be completed next spring.

The following organizational changes were recently announced by the Riverside Cement Company, Riverside, Calif., a division of the American Cement Corporation:

JOHN H. ASMANN has been elected controller of the company. Mr. Asmann was employed by Riverside in 1943 as assistant comptroller.

ROBERT L. LAMBERT, formerly controller of Riverside, has been elected treasurer of the company. He was employed in 1955 as a staff accountant and elected controller of Riverside in December, 1957.

ROBERT E. HYCHE was promoted to marketing manager—white cement. In his new capacity Mr. Hyche will be responsible for planning and supervising Riverside's white cement marketing program. Riverside is slated to begin production of white cement early in 1961. Prior to his promotion, Mr. Hyche was manager of administrative services.

STANLEY L. TIMMINS has been promoted to sales manager—sack products. He was formerly assistant to the general sales manager.

VAUGHN R. HORSTMANN, manager of the South San Joaquin division of Pacific Cement & Aggregates, Inc., since 1947, has been promoted to the post of administrative assistant in the company's general offices in San Francisco. Mr. Horstmann joined Grant Pacific Rock Company in 1927, and continued with the company when it was acquired by Pacific Cement & Aggregates.

GEORGE F. KIRBY has been appointed assistant to the vice-president of domestic sales, new projects division, for Jefferson Lake Sulphur Company, Houston, Tex. Mr. Kirby, previously chief chemist of the Merichem Division of the company, will be located in Houston.

J. J. Jacobsen

JESSE J. JACOBSEN has been named manager of Limestone Products Company, Menominee, Mich., (a division of North Western - Hanna Fuel Company), succeeding the late STEPHENSON SMITH. Mr. Jacobsen has been with the firm since 1947, serving in an engineering capacity.

J. W. Schafer

J. W. SCHAFER has been promoted to the post of manager of the special products division of Peerless Cement Company (a division of American Cement Corp.), at Detroit. He is thus in charge of the production and marketing of the firm's entire line of protective paints and coatings.

Two executive changes have been announced for Ideal Cement Company:

E. F. SAULSBERRY, for many years in charge of the firm's pur-

E. F. Saulsberry

F. N. Price

chasing program, has been elected vice-president, purchasing. His former title was general purchasing agent.

FRANK N. PRICE was elected vice-president in charge of industrial relations. For many years he has been in charge of Ideal's labor and personnel relations; he was named director of the industrial relations department when it was newly formed in 1956.

# MOUNTAIN-MOVING BELT CONVEYORS IN 12th YEAR WITH ORIGINAL IDLERS

**Barber-Greene conveyor system still going strong after handling up to 830,000 tons yearly for Blue Ridge Stone Corp.**

The Blue Ridge Stone Corp., Roanoke, Va., is blasting, trucking, crushing and conveying away a limestone mountain at the rate of up to 830,000 tons yearly.

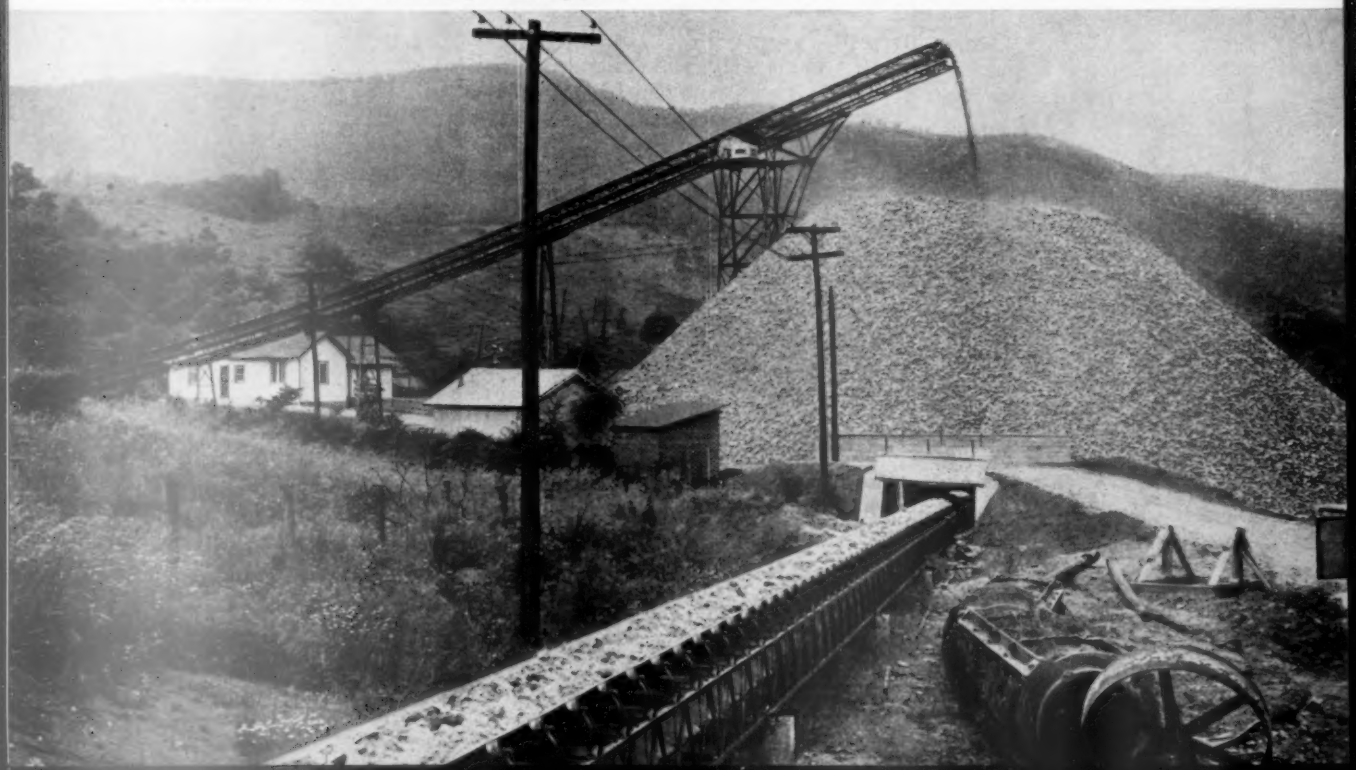
After trucks make the short haul moving blasted rock from face to primary crusher, a 4-flight, 4,150-ft. Barber-Greene conveyor system hustles the limestone from quarry floor to finishing plant.

President Abney Boxley observes, "We've increased production more than 30% over our old all-rail haulage method.

"Since our Barber-Greene conveyors became operative in 1948, we've had 12 years of dependable service with minimum maintenance and downtime. Practically all 1,500 original idlers are still in service and belt life has been extremely good.

"By including a 6,000-ton surge pile ahead of the No. 4 conveyor, we can operate the plant for

6,000-ton surge pile at end of 700-ft. No. 3 conveyor keeps finishing plant operating 24 hours after quarry shut-down. Rock is reclaimed on 1,600-ft. belt leading to finishing plant.



After double reduction of stone in quarry, limestone gets fast ride upgrade on 30" belt of 1,600-ft. Barber-Greene Conveyor enroute to surge pile and then to finishing plant. 4-flight system totals 4,150-ft.

as long as 24 hours after quarry operations have stopped if we bulldoze the stockpile."

Get this same lowest-cost-per-ton-mile solution to your material handling problems by calling your Barber-Greene Conveyor Specialist. He sells pre-engineered and pre-aligned standardized conveyors plus broad design experience . . . a combination that is preferred throughout the aggregate industry for hard-dollar reasons.

**Send For New Idler Bulletin**

New 44-page Idler Bulletin describes the more than 800 units available in the complete Barber-Greene line, tells how their years-ahead features bring longer life and greater economy to every job. Ask for your copy today.

***Your belt conveyor equipment headquarters***

Representatives in Principal Cities of the World

**Barber-Greene** BG

Main Office and Plant AURORA, ILLINOIS, U.S.A.
Plants in DeKalb, Illinois. Detroit. Canada. England. Brazil. Australia

**CONVEYORS • LOADERS • DITCHERS • ASPHALT PAVING EQUIPMENT**

Finishing plant is last processing point for stone after 4,150-ft. conveyor ride from quarry. Short conveyor loads truck-loading hoppers. Bulk of output is loaded into railroad cars shown on siding.

LOUIS ST. LAURENT, former prime minister of Canada, was named board chairman of the Belgian-backed Miron Co., Ltd., Montreal.

Control of the Miron organization was taken over by the Belgian S. A. Cimenteries et Briqueteries earlier this year. Prior to the sale Miron had built a cement plant near Montreal with an annual capacity of 4,000,000 bbl., at a cost of $30,000,000.

The election of DENNIS TEASDALE as vice-president of finance for Granite Rock Company and Central Supply Company, Watsonville, Calif., has been announced.

H. BOBBITT AIKIN and HARRY A. SMITH, both field engineers with the Calcium Chloride Institute, have been named senior regional engineers. This is a newly created position that includes supervision of field engineering, research, and other engineering and technical activities in assigned regions.

Mr. Aikin, who has worked in the Washington, D. C., area, will have responsibility for the eastern-southern region. Mr. Smith, from Racine, Wis., will be in charge of the central-midwest region.

JAMES T. RYAN has been appointed assistant director of industrial relations for Material Service, division of General Dynamics Corporation. Mr. Ryan was previously personnel director for Fireman's Fund Insurance Company.

J. H. LAURENT has been appointed managing director for Lafarge Cement of North America, Ltd., Richmond, B. C., Canada, it has been announced.

J. SINCLAIR, president and managing director of Deeks-McBride Ltd., Vancouver, B. C., was named to the board of directors.

PAUL W. CONAWAY, president of Brewer & Brewer Sons, Inc., has been appointed to the board of governors of the National Bituminous Concrete Association.

WILLIAM S. HOFFMAN has been named chief chemist at The Whitehall Cement Manufacturing Company, Cementon, Pa. He succeeds WILLIAM F. MACKENZIE who retired in October after nearly 40 years in the cement industry. Mr. Mackenzie has served with several firms, including the Praetoria Portland Cement Company, Ltd., Johannesburg, South Africa. Mr. Hoffman has been assistant to Mr. Mackenzie since 1950.

W. S. Hoffman

E. L. Armstrong

ELLIS L. ARMSTRONG, Commissioner of Public Roads, U. S. Department of Commerce, will be named president of the Better Highways Information Foundation, which has its headquarters at 2000 K St., Washington 6, D. C. The foundation was organized this year as a non-profit, public service organization devoted to researching and disseminating information about national highway needs.

Mr. Armstrong has been Commissioner of Public Roads since 1958. Prior to that period he was director of highways for the state of Utah. Previously he had served on such projects as the land, water, and transportation system development in Egypt in 1953, and the High Aswan Dam Project, and the power portion of the St. Lawrence Seaway.

JEROME (BUD) SUPANICH has been appointed sales representative in the Detroit division of Huron Portland Cement Co., Detroit, Mich.

RICHARD THOMAS has been appointed to the newly created post of director of advertising and public relations for the Riverside Cement Company, Los Angeles, Calif.

JACK C. MCCOE has been appointed assistant technical director of Permanente Cement Company, Oakland, Calif. Prior to joining Permanente, Mr. McCoe held the position of technical director of the cement division of Pittsburgh Coke & Chemical Company. He will have headquarters in the technical laboratory near San Jose, Calif.

Mr. McCoe is a member of four subcommittees of the American Society for Testing Materials and the research committee of the American Concrete Institute. He is the author of a technical publication, *Granulated Slag for Portland Blast-Furnace Slag Cement.*

JOE V. WILLIAMS has been named district engineer for the Portland Cement Association in Hawaii. He is maintaining temporary quarters with the Hawaiian Cement Corporation in Honolulu. Mr. Williams will make available the resources of the association's research, information, and promotional divisions.

R. B. Ladoo

RAYMOND B. LADOO, consulting engineer on industrial minerals, Newton, Mass., will receive the 1961 Hall Williams Hardinge Award, according to an announcement from the American Institute of Mining, Metallurgical, and Petroleum Engineers. The presentation will be made at the 90th annual meeting of A.I.M.E., to be held in St. Louis from February 26 through March 2, 1961.

The award to Mr. Ladoo is "for his work as engineer and author in bringing about wider recognition of the vital part played by industrial minerals in the national economy."

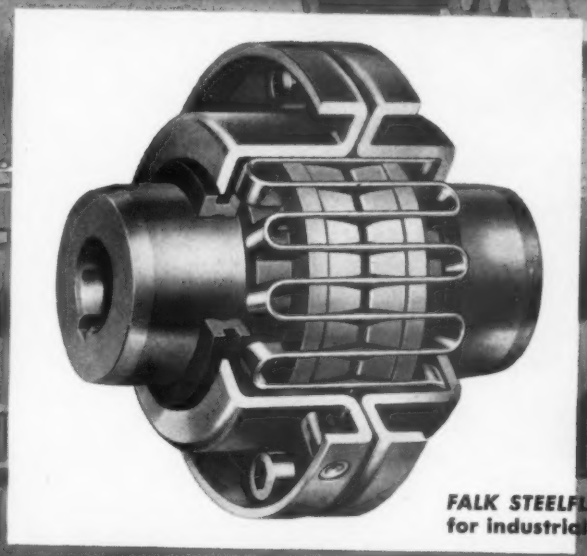
Mr. Ladoo was a co-organizer of the A.I.M.E. Industrial Minerals Committee, which became the Industrial Minerals Division of the Society of Mining Engineers of the institute. He has been a director of A.I.M.E. and a director and treasurer of the Society of Mining Engineers.



*Enter 75 on card, page 183* →

# FALK

## A GOOD NAME IN INDUSTRY



**FALK STEELFLEX COUPLINGS**
**for industrial applications... large or small**

## Giant Falk Coupling smooths out steel blooming mill performance

On a blooming mill at the Copperweld Steel Company plant in Warren, Ohio, installation of a large Falk Steelflex coupling between motor and pinion stand eliminated troublesome noise and vibration which threatened to damage mill machinery. Transmitting 5,000 hp at 50/100 rpm, this is not the largest Falk coupling... others are designed to transmit up to 130,000 hp at 100 rpm.

This installation and others like it prove the Falk concept of shaft coupling design—namely, a modern shaft coupling must contribute to the successful performance of the machinery system.

What does this mean to you? Just this: On large machines as well as small, the exclusive Falk grid-groove design does make a difference, and the difference is torsional resiliency with the strength of steel...reason enough to specify Falk Steelflex couplings as "long life" insurance for your connected machinery.

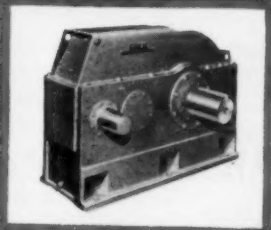
Falk Steelflex couplings are available in standard designs in 34 sizes for applications from .3 hp at 100 rpm to 130,000 hp at 100 rpm, with excellent delivery. Write for Bulletin 4100.

**THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN**
*MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS*
Representatives and Distributors in most principal cities

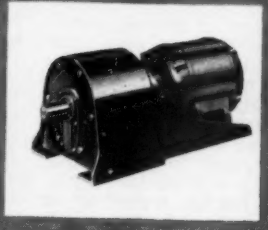
• • •

***A Point to Ponder***...When you need gear drives or shaft couplings of "FALK OR EQUAL" quality, where but from Falk can you get the "OR EQUAL"?

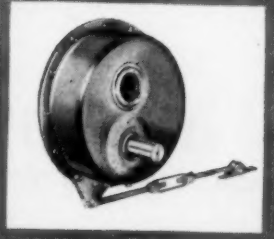
**Other members of America's First Family of Power Transmission Products**



**SPEED REDUCERS.** Parallel Shaft up to 3500 hp. Ask for Bulletin 1100. Also Right Angle and Concentric Shaft designs.



**ALL-STEEL MOTOREDUCERS**—up to 75 hp. Horizontal, Vertical, and Right Angle. All-Motor and Integral Types. Ask for Bulletin 3100.



**SHAFT MOUNTED DRIVES**—up to 125 hp. Ask for Bulletin 7100. Also Flange Mounted and Screw Conveyor Drives.

FALK, STEELFLEX and ALL-MOTOR are registered trademarks

# Five shots in a 1¼" circle at 50 feet. Faster. And quieter.

**(Fired by the Ringblaster® Kiln Gun)**

Highest accuracy plus the extraordinary smashing power of Western Super-X Industrial Ammunition are the reasons why Ringblaster helps to keep more rotary kilns productive than any other kiln gun in use today.

The Ringblaster is a rock-solid firing platform to which both bead and bore sights have been added, making it a precision instrument for demolishing kiln clinker rings with the fewest possible shots. It's fast too. A short stroke action and streamlined loading procedure give it a rate of fire that approaches "automatic." (Also quieter. It's the first kiln gun factory-equipped with a sound reducer.)

Note to plant managers: the power you buy is the power that's delivered to the clinker rings. Western's patented cup-wad seals the explosion gases behind the lead slug. There's almost no blow-by. Another exclusive Western development is the impregnated capsule that surrounds the slug. It virtually eliminates lead buildup in the barrel and the sound reducer. Hundreds of thousands of test rounds have proven that barrel life is increased up to 200%.

The Ringblaster has accuracy, power, speed of operation: that's what keeps kilns economically productive. Write us for details on the Ringblaster and the availability of shells designed for your specific needs. ***Ramset*® *Fastening System***

WINCHESTER-WESTERN DIVISION **Olin** WINCHESTER AVE., NEW HAVEN 4, CONN.

Strength, Economy, Durability Steel

# Armco Dredge Pipe Provides Longer Service Life, Lowers Cost

Pit and quarry operators find that Armco Dredge Pipe handles more material and lasts longer at lower cost per foot.

The interior is smooth and highly abrasion resistant.

Put Armco Dredge Pipe in *your* materials handling system. Compare its serviceability with other pipes you have used.

For economy tips on the use of Armco Dredge Pipe, just fill in and mail the coupon. An Armco Sales Engineer will call at your job site without cost or obligation.

**Armco Drainage & Metal Products, Inc.**
4071 Curtis Street, Middletown, Ohio

Have an Armco Sales Engineer call, without obligation, to explain Armco Dredge Pipe economy.

Name_____

Title_____

Organization_____

Street or Box No._____

City_____ Zone____ State_____

ARMCO Drainage & Metal Products

# If you use rear-dump haulers

Backed by better than 25 years of specialized experience in building off-highway earthmoving equipment exclusively, Euclid's modern rear-dump line incorporates advanced engineering that is a result of unmatched field experience. From the 10-ton Model R-10 to the big 55-ton "Euc" with two engines and a total of 672 h.p., Euclid Rear-Dumps are job proved to meet today's requirements for big performance. This greater dimension . . . in range of capacities, in choice of engines, transmissions and tire sizes, and in type of hauler . . . and in parts and service facilities of a world-wide dealer organization, too . . . can mean lower hauling costs and more work-ability on every one of your rear-dump jobs.

Have the Euclid dealer in your area give you facts and figures to compare with your own hauling costs . . . you'll find Euclid's greater dimension pays off in a better return on your investment. EUCLID Division of General Motors • Cleveland 17, Ohio

## Payload capacities of 10, 15, 18, 22, 27, 40 and 55 tons . . . also semi-trailer models of 12, 22, 35 and 50 ton capacity.

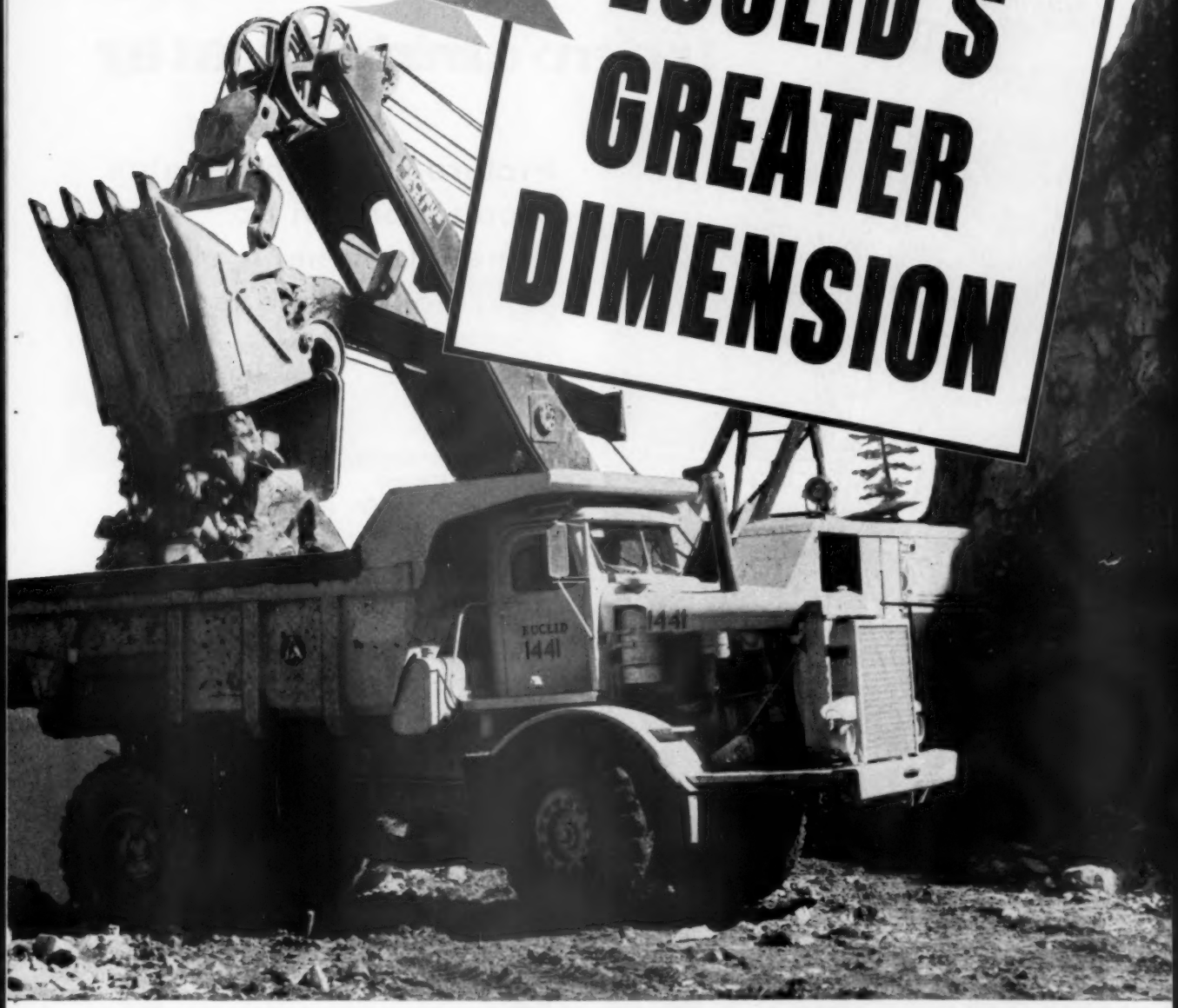
## When you compare Rear-Dump Haulers, check these 7 points . . .

- is maker experienced in the field . . . known for building a dependable, well-engineered product?
- does machine have required performance ability needed . . . capacity and speed for high production work, power and traction for rough going and steep grades?
- well-balanced for size of loading equipment . . . hoppers and controlled dumping needs?
- is there good parts and service availability . . . at both manufacturer and dealer level?
- are maintenance manuals, parts books and service literature complete . . . is machine designed for easy servicing?
- is machine easy to operate . . . convenient controls . . . good visibility . . . operator comfortable so that efficiency is maintained for entire shift?
- can required production be maintained at low cost . . . construction rugged enough to withstand heavy service with minimum maintenance?

## Euclid Rear-Dumps meet every one of these important requirements . . . and more!

...check

# EUCLID'S GREATER DIMENSION




**BIG POWER . . . BIG CAPACITY . . . BIG PERFORMANCE**

Model R-27 has heaped capacity of 26½ yds. . . . rated payload is 54,000 lbs. . . . available with Cummins 335 h.p. or GM 336 h.p. engine . . . 4-speed Torqmatic Drive with converter lock-up and Torqmatic Brake . . . dual hydraulic booster steering . . . 18.00 x 25 tires on all wheels . . . rugged body with twin hoists . . . top speed with full payload, 34 mph. . . . available in two body types, standard for all-around use and quarry for hauling big rock.

**ENGINEERED FOR EASY SERVICING**

Like other Euclids, the R-27 is of simple, rugged design for years of dependable performance at minimum maintenance cost. When repair or replacement of major components is necessary, service-minded engineering saves time and money, too. For example, a transmission can be removed and replaced in just one-eighth the time required for the same work on a competitive hauler of the same capacity . . . engine replacement takes only one-half as many man-hours.

GM GENERAL MOTORS EUCLID

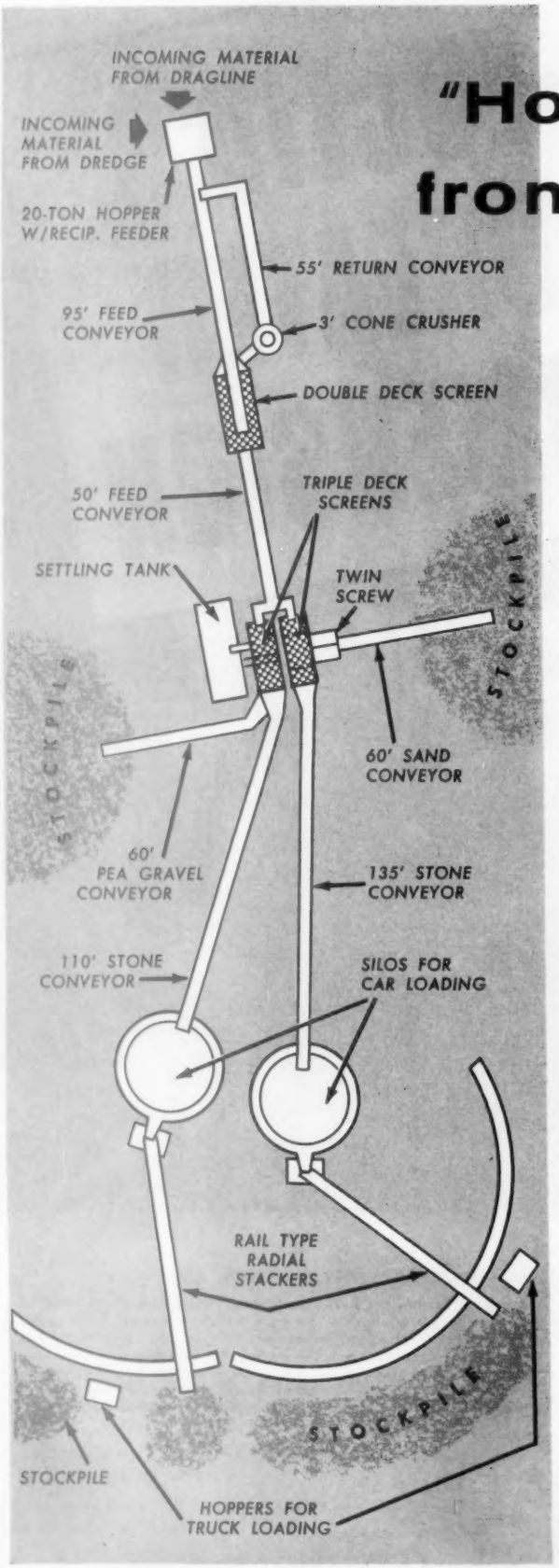
EUCLID

*FOR MOVING EARTH, ROCK, COAL AND ORE*

# "How we set up from underwater

## Picture report highlights production set-up of new Lippmann plant at Winona, Minnesota

*by Ernie Wuestenberg,*
*General Manager*
*Winona Aggregate Co.*
*Winona, Minnesota*



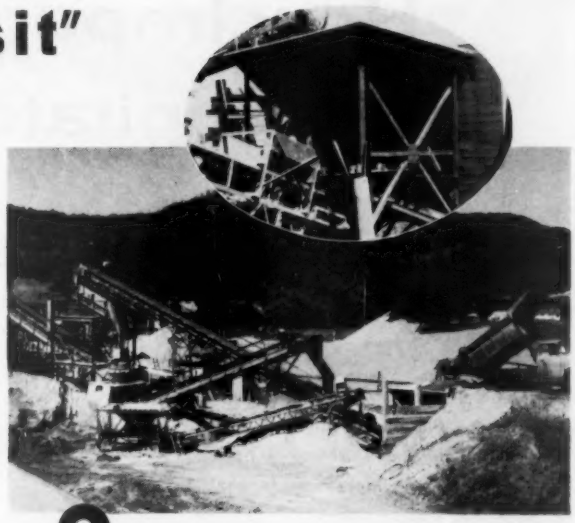
**3** **MINUS 1½" MATERIAL** is sized by two side-by-side triple-deck washing screens. Fines are sent to scalping tank and double screw classifier dehydrator, to produce specification sand. In addition, 3 sizes of gravel are produced for ready-mix and other markets.

### Lippmann equipment

20-ton feed hopper, with 48" x 7' reciprocating feeder
4' x 14' single-deck 4-brg screen
two 4' x 14' triple-deck 4-brg washing screens
36" x 95' feed conveyor
24" x 55' return conveyor

# to produce 350 tons/hr. glacial deposit"

**1** **DREDGE SUCKS UP** igneous glacial outwash of about 50% sand and 50% gravel from underwater deposit . . . averages 200 tph input to plant. Additional raw material is supplied by dragline working off-shore . . . is shuttled to plant by 5-yd. trucks (see next photo).



**2** **INCOMING MATERIAL** from dragline and dredge converge at 20-ton-capacity hopper (inset). Double eccentric reciprocating plate feeder maintains uniform flow of material . . . feeds double deck screen (upper left), which scalps off plus 1½" material for crushing.

**4** **TWIN RADIAL STACKERS,** mounted on rails, provide efficient means of building large-volume stockpiles . . . "do the work of two cranes and crane-operators." At time this photo was taken, stacker output was being fed to bins for immediate truck-haul to customer job-sites.

**5** **ENTIRE PLANT** was designed and equipped by Lippmann. Plant has performed steadily, up to 16 hours a day, 6 days a week. Says Mr. Ray Larson, Jr. (President of Winona Aggregate Co., and Sec.-Treas. of parent company Wissota Sand & Gravel Co.), "We have profited by the continued use of Lippmann equipment for over 30 years, in 6 plant locations."

## at this plant

36" x 50' conveyor (to washing screens)
three 24" x 60' conveyors (stone stockpiling)
30" x 60' conveyor (sand stockpiling)
two 80' radial stackers
steel framework, supports, spouts, etc.

**LIPPMANN**
**ENGINEERING WORKS, INC.**
Milwaukee 14, Wisconsin

W-M-12-60

# How important is Precipitator Size?

A common fallacy assumes a larger precipitator with lower gas velocity is preferable to a smaller precipitator with higher gas velocity.

**This assumption overlooks important economies now obtained with:**

**(a) Efficient voltage application**

**(b) Specific control of electrical sections**

**(c) Electrode design improvements**

**(d) Automatic Rapper Control**

**(e) Accurate internal baffling**

**(f) Proper control of gas flow, based on three-dimensional model studies**

Close familiarity with these techniques and improvements has enabled us to guarantee 99% collection on large, modern installations.

## Applied Voltage

Let's take Applied Voltage as a start. *If you double the operating voltage in a precipitator, it is equivalent to adding three times again as much collecting electrode area—or building a precipitator four times as big.*

If Applied Voltage is this important, how can evaluation engineers make sure a precipitator is operating with maximum voltage at all times?

Generally, the amount of arc-over in the precipitator determines the practical operating limit. Provision should be made in the precipitator's control to measure and integrate this arc-over so it can be used as the motivating factor in the control.

Stated simply, a precipitator must have control equipment which guarantees maximum voltage input regardless of changes in gas flow, particle size or resistivity, etc.

## Sectionalization

Another important point in evaluating Applied Voltage is the question of how much sectionalization is provided in the specifications. Gas conditions are not constant throughout any precipitator. Higher efficiencies are obtained if the precipitator is divided into sections, each of which has its own voltage control set. In this way, maximum voltage is applied to each section regardless of variations in gas conditions from one section to another.

## Reentrainment

Another factor affecting collection efficiency is the possibility of dust reentrainment. This refers to re-suspension of dust that has already been collected on the collecting electrodes.

Engineers are now demanding proof that collecting plate design provides correct baffling to shield the collecting surface against the sweeping and scouring effects of moving gas streams.

Precipitators using properly designed collecting electrodes can be 25% to 50% smaller than a precipitator using improperly designed electrodes. Once again, the emphasis is on proper design, not precipitator "size".

## Proper Rapping

Another cause of reentrainment is improper rapping. A rapping blow that is too hard may dislodge too much collected dust and cause reentrainment. On the other hand, if the blow is too "soft", the dust builds up on the collecting electrodes, disrupts electrical conditions and necessitates reduced operating voltage.

As we said, conditions inside the precipitator are not constant. Gas flow, temperature particle size and resistivity are all constantly changing. Rapping intensity must also change to meet these varying conditions. This means that an evaluation engineer must be sure the rapping equipment specified is fully adjustable to meet all these changing conditions.

## Sneakage

Now that collection efficiencies demanded by industry are becoming higher and higher, sneakage is an important consideration. This refers to that part of the gas stream which might sneak around the treatment zone.

Proper internal baffling is the only way to make sure that the entire gas stream flows through the treatment zone. For this, evaluation engineers must rely on the experience of the precipitator manufacturer in three dimensional model studies and research on full-scale precipitators.

## Gas Flow Pattern

A major factor affecting the relationship between precipitator size and performance is the gas flow pattern across the face of the precipitator. When you consider the fact that proper flow can mean another 25% - 50% reduction in precipitator size, it pays to investigate the design elements affecting this gas flow pattern. Again, evaluation engineers should ask the manufacturer how he has provided for correct gas flow.

In this brief review we have been able to hit only a few high spots of precipitator evaluation. It is a complicated problem because of the many variables in gas conditions and the combinations of electrical, electronic and mechanical equipment involved.

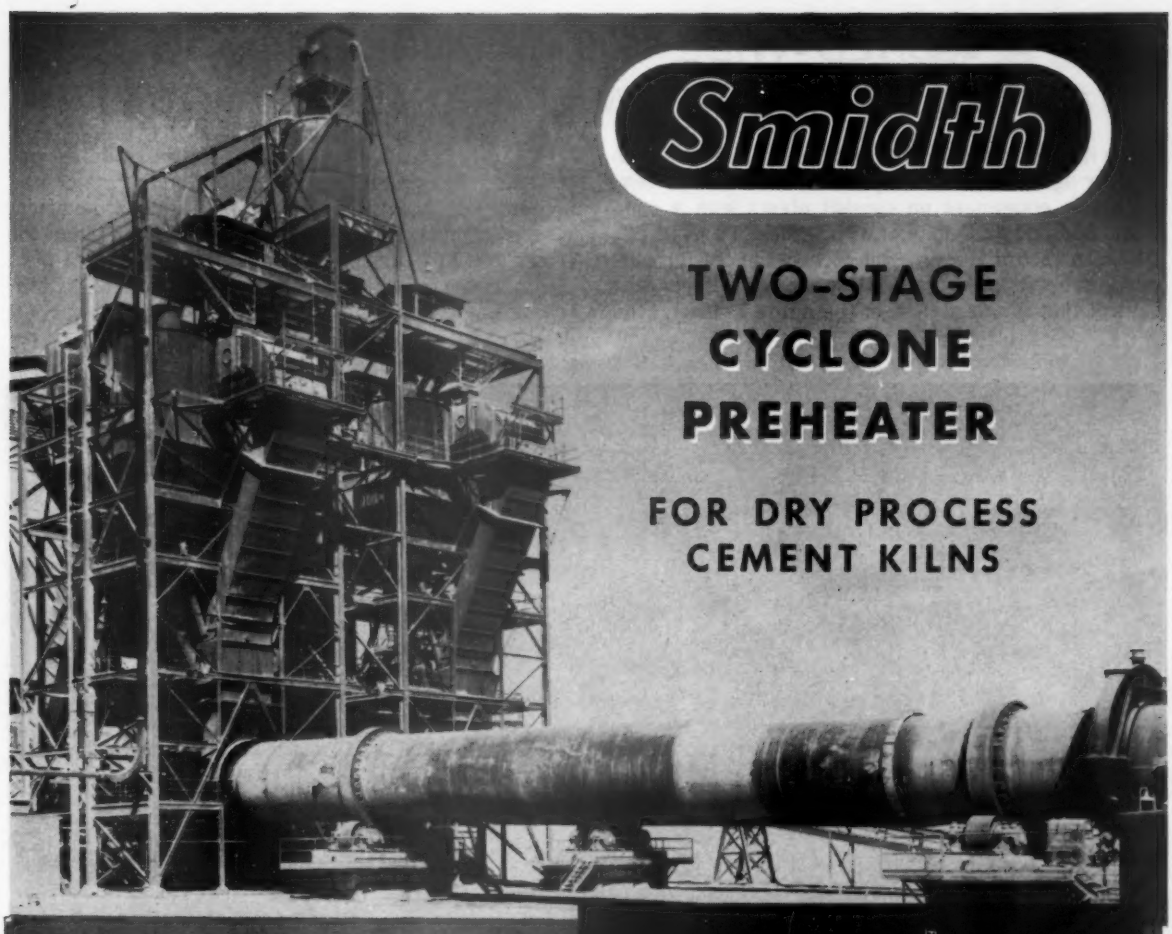
If you want more information on any of the points discussed in this review, please contact your nearest Research-Cottrell representative or write us in Bound Brook, N. J. Our 48 years of gas cleaning experience are at your service.

**Research-Cottrell, Inc.**

*Office and Plant: Bound Brook, N. J.*
*Representatives in principal cities of U.S. and Canada*



Enter 82 on card, page 183



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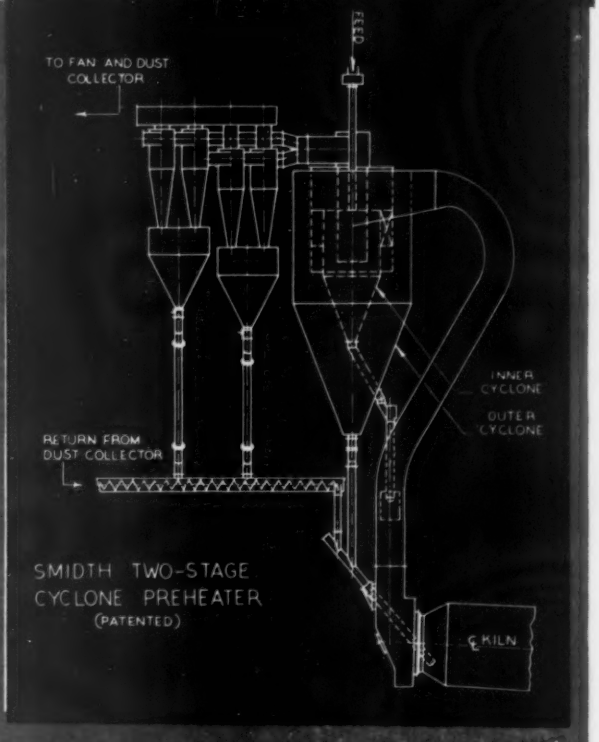
- Low Fuel Consumption
- High Quality Cement
- Simple Operation

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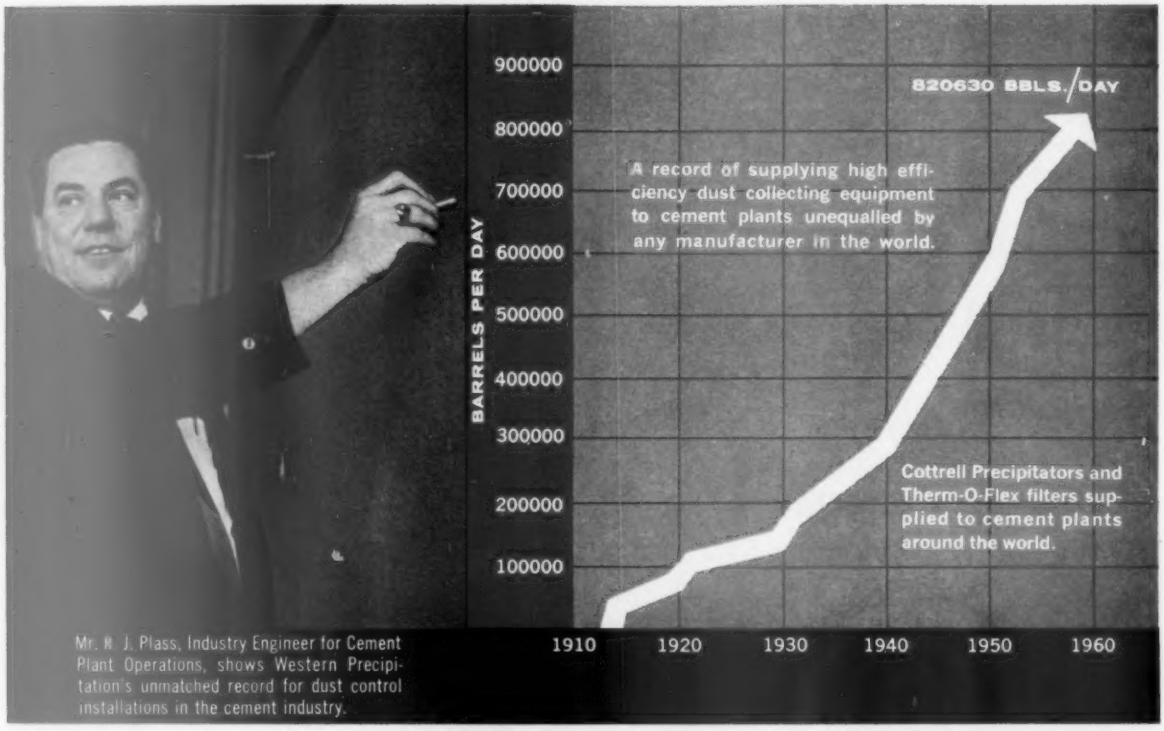
# A WORLD-WIDE "EXPERIENCE RECORD"
## *UNEQUALLED IN THE ENTIRE CEMENT INDUSTRY!*

**Since its first cement plant installation almost a half-century ago, Western Precipitation has installed dust collection equipment on cement plants with a combined operating capacity of over 820,000 barrels per DAY... a record for wide-range experience, for customer satisfaction and overall "know-how" of kiln dust control that is unequalled in the entire industry!**

Not only is this a testimonial to the reliability of Western Precipitation equipment (for the major percentage of these installations were repeat orders from satisfied customers) but it is also an indication of the way Western Precipitation equipment has kept pace with new processes and new advancements as they have been adopted by the cement industry.




Mr. R. J. Plass, Industry Engineer for Cement Plant Operations, shows Western Precipitation's unmatched record for dust control installations in the cement industry.

**Regardless of your type of operations, Western Precipitation engineers can provide an unbiased evaluation on the type of equipment best suited to your particular requirements—an evaluation backed by the industry's top organization in cement plant dust control!**

**"Cottrell" Electrostatic Precipitators—the equipment pioneered by Western Precipitation for high efficiency, long life electrostatic separation of dust particles from gas streams.**

**"Multiclone" Centrifugal Collectors—the multiple small-tube mechanical collectors pioneered by Western Precipitation for high-efficiency, low maintenance centrifugal separation of dust particles from gas streams.**

**"Therm-O-Flex" High Temperature Filters—the woven glass filter systems that handle gas inlet temperatures as high as 600°F. and feature new type silicone-treated filters that can be cleaned automatically without destructive shaking or high-frequency vibration.**

*Write for descriptive literature on Western Precipitation's equipment for kiln dust collection!*

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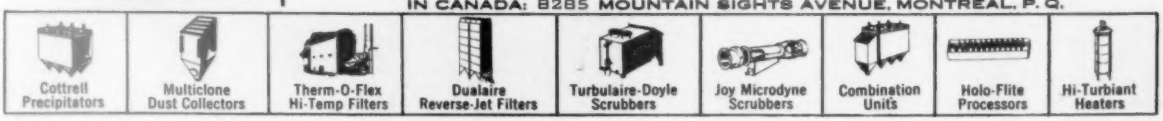


# The Editor's Page

## Aggregates Set New Records, Cement Lags—Increases Expected for All in 1961

THE nonmetallic mineral (pit and quarry) industries in 1960 had a good year but did not set a record, as a whole. A sharp drop in portland cement shipments—for the second-best year in history—counteracted a slight increase in aggregates production. The other nonmetals, collectively, maintained the high level of the preceding year. Construction volume was down slightly in 1960. Prospects are for a slight increase in construction volume in 1961 and cement and aggregates are expected to go along. Cement, however, is not expected to quite reach the 1959 all-time record level. The other nonmetals should show a general slight improvement.

The above, briefly, is the picture, as presented considerably more in detail in the Review and Forecast Section of this January, 1961, issue of *Pit and Quarry*. In it we are making available to our readers the latest and most nearly complete authentic information on present conditions in the nonmetallic mineral industries, and on prospects for 1961 and later.

According to the latest available information, the dollar volume of new construction in 1960 was about $55 billion, or about 2 percent below the 1959 record. About $20 billion was spent for maintenance and repair, for a total of about $75 billion, as compared to $76 billion in 1959.

Portland cement shipments in 1960 were down about 6 percent from 1959. U. S. Bureau of Mines figures for the first ten months of 1960 and estimates for the remainder of the year indicate that shipments were about 315 million bbl., second only to the 1959 all-time record of 333,767,000 bbl. Sand and gravel output in 1960 is estimated to total about 735 million tons, less than 1 percent over the record 730-million-ton output of 1959. These figures include both commercial and non-commercial production and industrial sand. Crushed stone production in 1960 was about 475 million tons, an increase of about 1 percent over the 470-million-ton record set in 1959. These figures include both commercial and non-commercial production, as well as agstone, but not the stone used in cement and lime manufacture. Judging from incomplete information, lime and gypsum production was at near-record levels; and sulphur, fluorspar, and mica were among those showing gains over last year.

All indications are that there will be about a 4 percent increase in the dollar volume of construction in 1961. This would mean a record volume of about $57 billion for new construction; and about $20 billion is expected to be spent for maintenance and repair, for a total of about $77 billion—a new record.

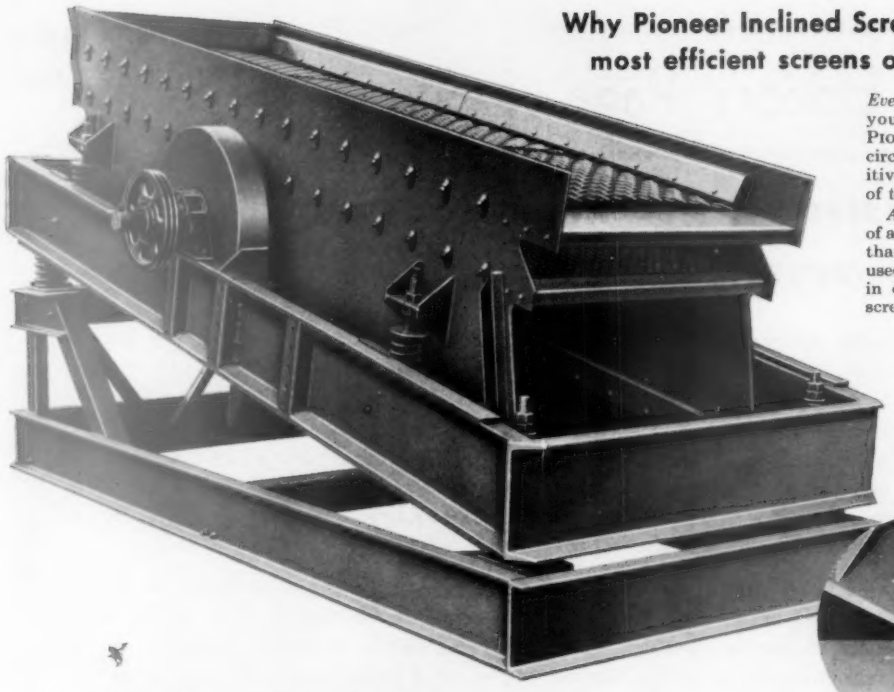
These construction estimates, together with producers' reports and other information, indicate slight increases for cement and aggregates in 1961. Cement shipments are expected to go up about 2 to 4 percent to about 325 million bbl. Sand and gravel and crushed stone production should be up about 1 to 2 percent, for new records of about 740 million and 480 million tons, respectively. Many of the other industries should show gains over the 1960 figures, and a moderate increase collectively. As a result, the *Pit and Quarry* industries should have another near record year.

Walter E. Trauffer

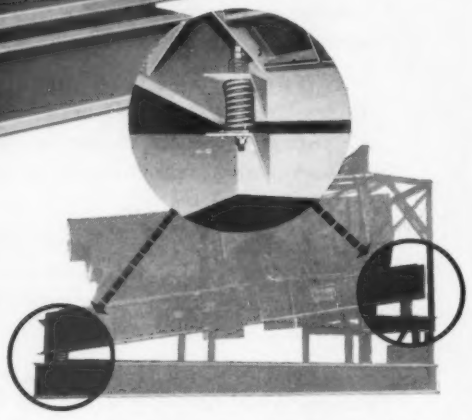
## Why Pioneer Inclined Screens are among the most efficient screens on the market today

*Every inch* of this Screen works for you. No matter what the load, PIONEER'S perfectly balanced full-circle throw provides the same positive *downhill* agitation at each end of the screen as in the middle.

*Also* . . . the easy downhill slope of a PIONEER Inclined Screen means that all the energy is effectively used for screening . . . not used up in conveying material across the screen cloth.



Note how Pioneer secondary spring suspension actually floats screen frame to keep vibration in the screen and protect supporting structure.



# What's different about these new-type Vibrating Screens?

**Answer:** *Virtually no vibration transmitted to the supporting structure.*

PIONEER'S new and exclusive system of dual spring suspension keeps vibration in the pan . . . *where it belongs! The supporting structure doesn't have to fight back.*

This is important, for no matter how perfectly any screen may be balanced when it leaves the factory, many things can happen later to destroy that balance. Uneven loads, clogged screens, worn bumpers, or a less-than perfect installation will disturb the balance and, in the case of conventionally mounted screens, this will set up undesirable vibrations in the supporting structure.

PIONEER engineers solved this problem by floating the screen frame on heavy coiled springs as shown in illustration at the right, above. Whether installed on bin, floor, sill or suspension mounting, these springs have 3 big advantages:

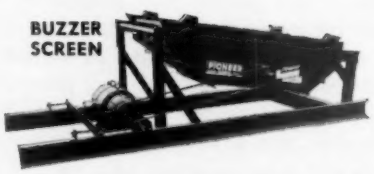
1. Springs absorb any induced vibration and prevent its transfer.
2. Motion of screen pan is improved to give even better screening efficiency. Heavier loads and higher capacities are more easily handled.
3. Strain on screen assemblies and frame is reduced, therefore less maintenance is required. Screen cloth and punched plates last longer.

For more information on PIONEER Vibrating Screens, see your nearest PIONEER Distributor.

## Other Inclined Vibrating Screens by Pioneer

**MESABI SCREEN**

This heavy-duty Vibrating Screen is built with brute strength to take harsh abuse. Frame is 18" car channel on I-beams reinforced with 8"-wide flange beams. Pans are ¾" or ½" thick. Four-bearing, heavy-duty shaft and other parts are correspondingly strong. Sizes from 4' x 10' to 6' x 14'.



**BUZZER SCREEN**

This small, compact Vibrating Screen fits on PIONEER Portable Conveyor. (With Mechanical Feeder at other end, this makes an efficient low-cost gravel plant.) Also available with bin mounting. 3' x 6' size produces up to 50 tph of ¾" material; 4' x 8' produces up to 90 tph of ¾" material.

## Free Handbook

For your free copy of *Facts And Figures* (the most complete and comprehensive handbook for the aggregates-producing industry), write to PIONEER ENGINEERING, Minneapolis 14, Minnesota, or contact your Pioneer Distributor.

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ANNUAL SPECIAL REPORT

pit and quarry

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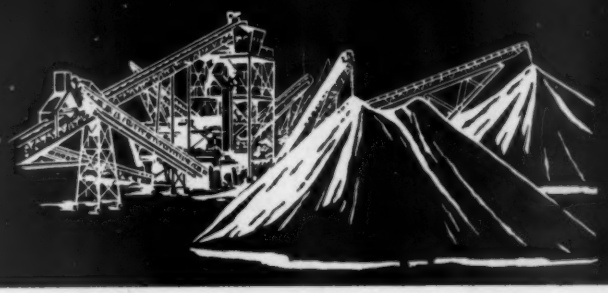

# REVIEW and FORECAST

## Of The Nonmetallic Minerals Industries

1960 | 1961

## 1960 Good—1961 Prospects Better

■ In 1960 the Pit and Quarry (nonmetallic minerals) industries apparently held their own. Portland cement shipments were down, but still the second-highest in history; aggregates were up slightly for new records; and the other industries as a whole were static. Construction volume was down slightly from 1959.

■ Prospects for 1961 are mildly optimistic. Construction volume is expected to be up more than enough to regain 1960 losses, and to carry with it the cement and aggregates industries—the latter to new records. The other Pit and Quarry industries, in general, should show a moderate increase.

■ ■ ■

CONSTRUCTION: **Eases Off a Bit in '60—Record Dollar Volume Expected in '61** ..... 88
—JAMES G. KOSTKA

CEMENT: **1960 Production, Shipments Down—but Second-Best Year in History; Moderate Increase Expected in 1961** ..... 94
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AGGREGATES: **Industries Reach Peaks, Hold to High Levels** .....108
—BUREN C. HEROD

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—BUREN C. HEROD

REVIEW and FORECAST

# Construction:

## ■ Eases Off a Bit in '60— Record Dollar Volume Expected In '61

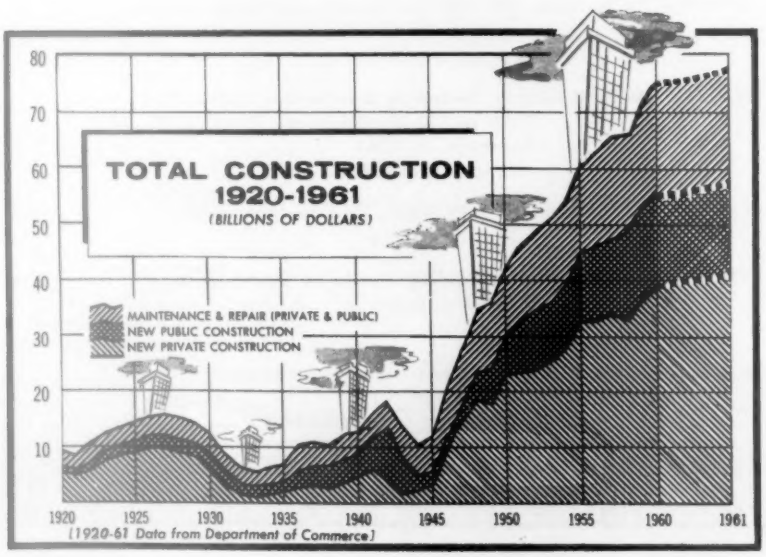
By J. G. KOSTKA

APPARENTLY we have reached an era when second best just isn't good enough. This certainly seems to be true in the case of construction. In 1960 construction volume amounted to an estimated $55.1 billion, second only to the record $56.2 billion of the year before. In spite of this excellent showing, 1960 construction was considered "disappointing" by many. Statistically, it was about 2 percent below the dollar volume of 1959. It was less than 0.4 percent below the dollar volume forecast for that year; still there was a feeling that construction hadn't come up to expectations. This may have been largely psychological, due to the fact that construction spent most of the year trying to catch up on the ground it had lost earlier in the year.

During the greater part of 1960 there seemed to be a general undertone of feeling that construction wouldn't come up to expectations. It started early in the spring, when construction normally begins its upward surge. This year, however, new construction lacked the strong initial punch that has been so prevalent in the previous years when new records were set.

A number of factors were attributed to the sluggish start experienced by construction in 1960. Poor weather received a good share of the blame early in the year. This was due to the prolonged period of cold weather that gripped most sections of the country through the middle of April. Then an extended rainy period followed, continuing into the early part of June. Naturally, this type of weather isn't conducive to all-out construction activity, and construction suffered somewhat as a consequence.

Another factor blamed for suppressing construction in 1960 was fairly tight mortgage money. This was especially true in the case of new residential dwelling units. Blame has been placed on this situation for the last two or three years, but it gained more attention this



year due to the marked drop in new residential dwelling units.

The final major factor that had a direct bearing on construction in 1960 was business itself. During the middle of the year we were in what economists called a mild business recession. This situation, coupled with the coming presidential election, created an atmosphere of uncertainty that hindered the year's construction progress to some extent. Just how strong this factor was in hindering construction is debatable, but it is quite conceivable that it was the most influential of the three reasons given.

After a good but unspectacular year in 1960, what can be expected from construction in 1961? At this time the prospects appear to be good. According to an annual outlook statement released by the F. W. Dodge Corporation, "The brightest spot on the economic horizon in 1961 will be construction. In fact, Dodge economists expect that construction contracts will show a slight increase next year, despite an expected mild dip in general business activity." Spokesmen for the Business and Defense Services Administration of the U.S. Department of Commerce display even greater optimism. In viewing 1961 they say, "Outlays for new construction are expected to rise 4 percent to a record $57.3 billion, surpassing the 1959 peak of $56.2 billion." This would make 1961 a record year in dollar volume and the second highest year in the physical volume of work put in place (adjusting expenditures for price changes) and only 2 percent below 1959, a year marked by strong influences carried over from anti-recession measures of 1958.

In addition to the $57.3 billion in new construction-put-in-place that is anticipated for 1961, approximately $20 billion more will be spent for maintenance and repair. This will bring the total construction expenditure to $77.3 billion. Our gross national product amounts to slightly over $500 billion; construction represents about 15 percent of it, thereby making it the largest industry in the United States today.

Before you can have construction, you must have the materials that make this industry possible. Basic materials such as sand, gravel, crushed stone, gypsum, lime, cement, etc., are all vital to its operation. In 1961 more than one billion tons of crushed stone and sand and gravel, and about 343 million barrels of cement will be used for construction.

After experiencing a 2 percent drop in 1960, private construction is expected to climb to $40.3 billion in 1961, an increase of 3 percent. The largest gains are expected to come from the residential buildings and nonresidential buildings (nonfarm) segments of private construction. These two groups, alone, are counted on to produce an additional $1.1 billion in construction in 1961.

Public construction, after a slight drop of 1 percent in 1960, should rise to about $17.1 billion in 1961.

**New Construction Put in Place in the United States, 1959, 1960, and Outlook for 1961**

| Type of Construction | Value (in Millions) 1959[1] | 1960[2] | 1961[3] | Percent of Change 1959-60 | 1960-61 |
|---|---|---|---|---|---|
| TOTAL NEW CONSTRUCTION | $56,233 | $55,100 | $57,300 | — 2 | + 4 |
| PRIVATE CONSTRUCTION, TOTAL | 39,892 | 38,900 | 40,250 | — 2 | + 3 |
| Residential buildings (nonfarm) | 24,469 | 21,950 | 22,600 | —10 | + 3 |
| New Dwelling units | 19,233 | 16,300 | 16,750 | —15 | + 3 |
| Additions and alterations | 4,468 | 4,750 | 4,850 | + 6 | + 2 |
| Nonhousekeeping | 768 | 900 | 1,000 | +17 | +11 |
| Nonresidential buildings (nonfarm) | 8,859 | 10,075 | 10,550 | +14 | + 5 |
| Industrial | 2,106 | 2,900 | 3,100 | +38 | + 7 |
| Commercial | 3,930 | 4,050 | 4,150 | + 3 | + 2 |
| Office buildings and warehouses | 1,954 | 2,050 | 2,250 | + 5 | +10 |
| Stores, restaurants and garages | 1,976 | 2,000 | 1,900 | + 1 | — 5 |
| Other nonresidential buildings | 2,823 | 3,125 | 3,300 | +11 | + 6 |
| Religious | 947 | 1,045 | 1,075 | +10 | + 3 |
| Educational | 525 | 590 | 650 | +12 | +10 |
| Hospital and institutional | 570 | 575 | 625 | + 1 | + 9 |
| Social and recreational | 550 | 675 | 700 | +23 | + 4 |
| Miscellaneous | 231 | 240 | 250 | + 4 | + 4 |
| Farm construction | [4]1,362 | [4]1,300 | 1,300 | — 5 | 0 |
| Public utilities | 4,995 | 5,275 | 5,500 | + 6 | + 4 |
| Railroad | 251 | 300 | 275 | +20 | — 8 |
| Telephone and telegraph | 952 | 1,100 | 1,050 | +16 | — 5 |
| Electric light and power | 2,072 | 2,050 | 2,050 | — 1 | 0 |
| Gas | [5]1,600 | [5]1,700 | 2,000 | + 6 | +18 |
| Other public utilities | 120 | 125 | 125 | + 4 | 0 |
| All other private | 207 | 300 | 300 | +45 | 0 |
| PUBLIC CONSTRUCTION, TOTAL | 16,341 | 16,200 | 17,050 | — 1 | + 5 |
| Residential buildings | 962 | 725 | 775 | —25 | + 7 |
| Nonresidential buildings | 4,514 | 4,800 | 5,175 | + 6 | + 8 |
| Industrial | 368 | 400 | 400 | + 9 | 0 |
| Educational | 2,656 | 2,875 | 3,100 | + 8 | + 8 |
| Hospital and institutional | 428 | 400 | 425 | — 7 | + 6 |
| Administrative and service | 568 | 615 | 700 | + 8 | +14 |
| Other nonresidential buildings | 494 | 510 | 550 | + 3 | + 8 |
| Military facilities | 1,488 | 1,325 | 1,325 | —11 | 0 |
| Highways | [5]6,000 | [5]5,700 | 6,000 | — 5 | + 5 |
| Sewer and water systems | 1,467 | 1,500 | 1,525 | + 2 | + 2 |
| Sewer | 906 | 890 | 835 | — 2 | — 6 |
| Water | 561 | 610 | 690 | + 9 | +13 |
| Public service enterprises | 551 | 650 | 650 | +18 | 0 |
| Conservation and development | 1,130 | 1,275 | 1,350 | +13 | + 6 |
| All other public | 229 | 225 | 250 | — 2 | +11 |

[1]Bureau of the Census statistics except where otherwise indicated.
[2]Bureau of the Census statistics Jan.-Oct. except where otherwise indicated; BDSA estimates Nov. and Dec.
[3]BDSA estimates.
[4]Based on data to be shown in a forthcoming Bureau of the Census release that will present corrected statistics for farm construction.
[5]BSDA estimates, based on the most recent available preliminary information. These differ from already published Bureau of the Census statistics which were derived from earlier information. The Bureau of the Census will revise its statistics early in 1961 in accordance with final data.

This is an increase of $850 million, or a 5 percent gain. Additional nonresidential buildings and highway construction are expected to provide the largest part of the increase in this category.

The outlook for new construction in 1961 is based on the assumption that the nation's total output of goods and services will remain at about 1960 levels. It is further assumed that, while the nation's economic pace in 1961 will not push most construction categories dramatically, public construction should benefit from higher spending by state and local governments, as well as by the Federal Government. Construction costs may rise somewhat less than in 1960.

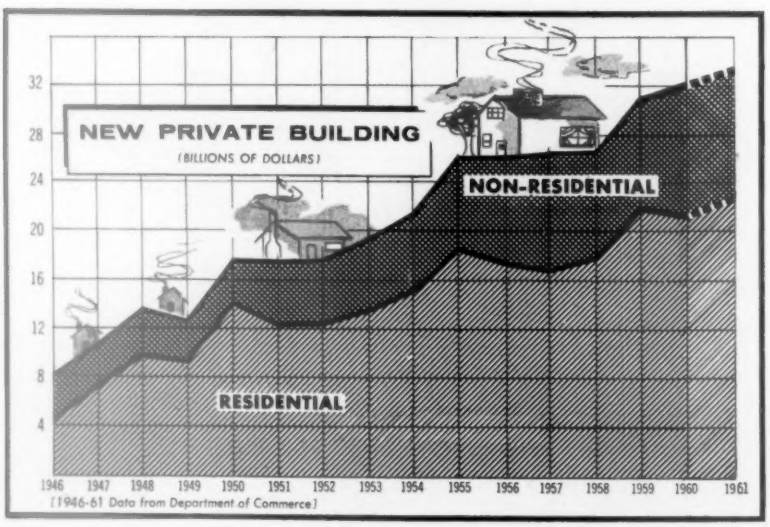
## PRIVATE CONSTRUCTION

**Residential Building** Making up this division are the following types of construction: new dwelling units, additions and alterations, and nonhousekeeping units. This is by far the largest of the construction divisions, accounting for about $21.95 billion in 1960, which was a 2 percent decline from the previous year. In 1961 this division should produce $22.6 billion in construction, a rise of 3 percent.

Dollar volume produced by new nonfarm dwelling construction fell from $19.2 billion in 1959 to $16.3 billion in 1960, a drop of 15 percent. Toward the end of 1960, however, there were indications that the decline had bottomed out and was remaining at an even level. This level is expected to be maintained throughout most of the first quarter of 1961, then start to rise late in the first quarter. This rise will continue throughout the remainder of the year.

The first half of the year will be equal to or very slightly better than the first half of 1960. The second half will definitely show a gradual rise in home building, extending into 1962. Some of the factors expected to influence the increase in sales of dwelling units are low down payment requirements; the trend toward a lengthened period for mortgage amortization; and the continuing shift of population to the suburbs.

The additions and alterations segment of private residential construction is expected to maintain its upward trend, but at a slightly slower pace than in 1960, when it registered a 6 percent gain over the year before. With a total of $4.75 billion in 1960, the 1961 total should be about $4.85, an increase of 2 percent. In nonhousekeeping outlays, the anticipated attainment of a $1 billion level, the ninth year of steady gain, represents a doubling of the 1957 volume of $500 million. The expected 11 percent gain between 1960 and 1961 follows a 17 percent rise in 1960. New motel construction continues to be the chief force in this category. In addition, private construction of college dormitories and some new large hotels lend strength to the nonhousekeeping category.



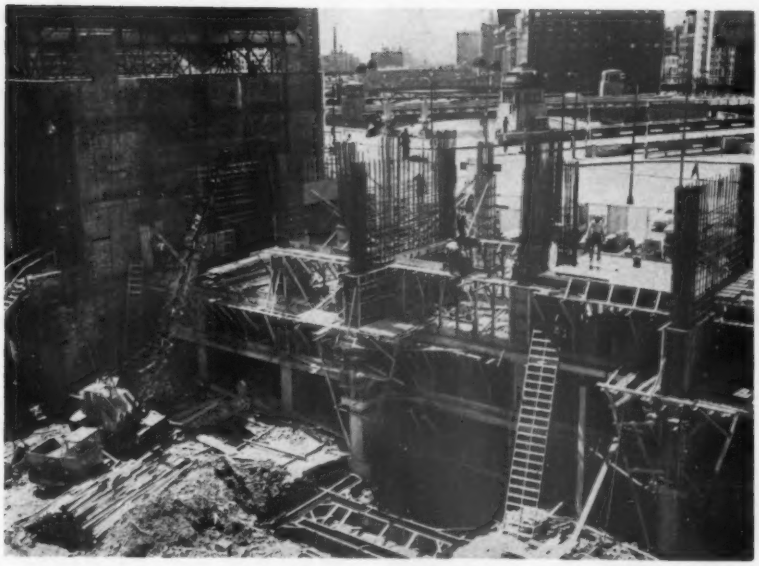
(1946-61 Data from Department of Commerce)

**Nonresidential Building** This division is made up of industrial, commercial, and other nonresidential buildings. Although residential construction sagged in 1960, the nonresidential building category soared by $1.2 billion to record levels, exceeding $10 billion. The 14 percent gain was mainly accounted for by a spectacular rise in industrial construction, for which an $800 million advance, 38 percent, is indicated. In 1961 a healthy rise of 5 percent is forecast for industrial construction, bringing its total up to $3.1 billion. Commercial construction, although it rose 3 percent in 1960, fell somewhat short of previous expectations. It is expected to rise another 2 percent in 1961.

Construction in the office buildings and warehouses segment of this division is expected to increase 10 percent in 1961 as the office building boom makes itself strongly felt. The drive for modern conveniences and for prestige associated with new ultramodern office buildings( centered mainly in New York City, but spreading throughout the country) is resulting in some building ventures that appear to be somewhat speculative in nature.

The stores, restaurants, and garages group, which barely exceeded its 1959 level in 1960, is expected to decline about 5 percent. This drop reflects the decline that took place in residential housing in 1960. A slowdown in residential construction tends to inhibit, with a certain amount of lag time, light commercial construction of this type.

The other nonresidential group, made up of religious, educational, hospital and institutional, social and recreational, and miscellaneous con-



Construction under way on 40-story apartment building near Chicago's Loop. In 1961 private residential buildings construction should be about $22.6 billion.

struction contributed strongly toward keeping 1960 construction expenditures close to 1959 peak levels. The net 11 percent gain in 1960 for these five categories reflects only a minor gain of about 1 percent for hospital outlays, but involves substantial 10, 12, and 23 percent upward movements over 1959 in the religious, educational, and social and recreational categories, respectively.

Outlays in the religious category, reaching the $1 billion level for the first time in 1960, are expected to slow down in 1961 and show only a three percent increase. Similarly, in the social and recreational category, the 4 percent rise foreseen reflects a strong carry-over of work from projects already under way at the beginning of 1961, but it implies probable declines in new starts due to the lower level of homebuilding in 1960.

Private educational construction has recovered from its 1959 drop and in 1961 will undoubtedly continue the 1960 gain. Both new college facilities and private elementary school buildings are involved in the optimistic picture of this group.

In the hospital category, the somewhat delayed effects of increased levels of Hill-Burton Federal-Aid funds now promises a sizable spurt in 1961 spending as a forerunner of further gains in succeeding years.

**Farm Construction** After a drop of 5 percent in 1960, with a total of $1.3 billion in construction, farm residential and service buildings in 1961 should maintain about the same level again. The exodus from the farms seems to have stopped, and farm construction should remain level as a consequence.

**Public Utilities** Outlays for public utility construction passed the $5 billion mark in 1960. Compared to 1959, it was 6 percent higher. A further rise is forecast for 1961, but this time it will be about 4 percent, which will put it in line with the average increase expected for all construction.

Railroad outlays should continue between the $250 and $300 million range of the last few years. Telephone and telegraph construction expenditures in 1960 appeared to be approaching a record high of $1.1 billion, slightly above the similar levels of 1956 and 1957. However, 1961 promises a slight cutback in present programs.

Because of the currently adequate power supply, electric light and power construction has stabilized at slightly above $2 billion.

In sharp contrast is the situation in the gas industry construction. The modest gain of 6 percent in 1960 represented a sharp cut-back in previous expansion plans, because during 1959 more miles of new proposed pipelines for transmission of gas were approved by the Federal Power Commission than in any previous year. It is expected, therefore, that 1961 construction expenditures for gas will reach the $2 billion mark. This is $300 million over 1960.

**All Other Private Construction** Private construction elsewhere falls into this division. It is relatively small, but showed a substantial increase in 1960, when it jumped from $207 million to $300 million, an increase of 45 percent. In 1961 the same high level of $300 million is anticipated.

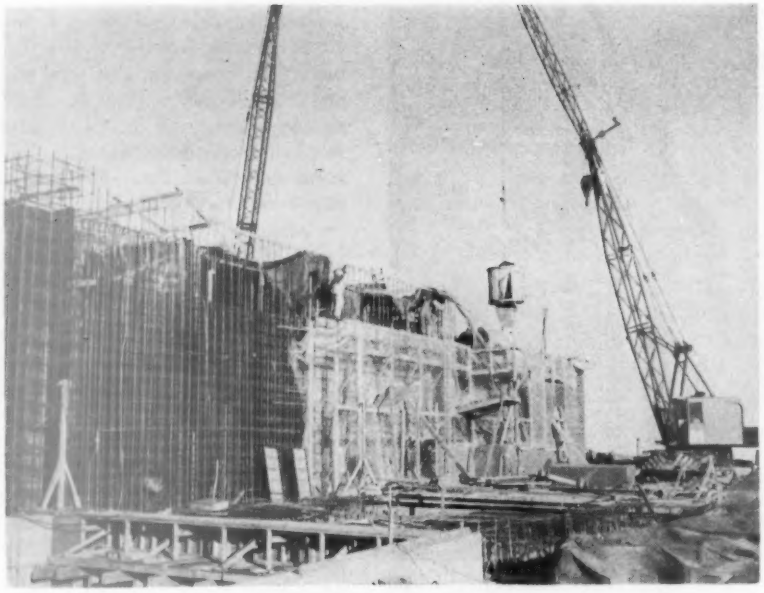
## PUBLIC CONSTRUCTION

**Residential Buildings** Expenditures for public housing jumped to $962 million in 1959, then fell to about $725 million in 1960, a drop of 25 percent. In 1961 public housing should climb again, when its total is expected to reach $775 million. This is an increase of 7 percent over the previous year.

One of the reasons a rise is forecast for public residential buildings in 1961 is that a large carry-over of work in the Federal-Aid public housing program is expected. Another reason an increase is predicted is that the New York Housing Authority program and Public Housing Administration-sponsored starts in 1961 are expected to amount to 40,000 units, in contrast with 32,000 units in 1960.

**Nonresidential Building** Making up this division are the following segments: industrial, educational, hospital and institutional, administrative and service, and other nonresidential buildings. Entire construction for this group amounted to $4.8 billion in 1960, an increase of 6 percent over the year before. In 1961 it should be close to $5.2 billion, showing an increase of 8 percent.

As far as the segments of nonresidential building are concerned



Missile base construction at Warren Air Force Base. The 1960 volume of $1.325 billion is expected again in 1961.

Below: A jet landing on a new concrete runway at O'Hare Field in Chicago. Public service enterprises, which had construction amounting to $650 million in 1960, should hit about the same volume again in 1961.

individually industrial construction is expected to remain at $400 million in 1961, the same as it was in 1960. Increasing voter approval of bond issues should boost educational construction from the $2.9 billion level reached in 1960 to $3.1 billion. Hospital and institutional construction after a drop from $428 million in 1959 to $400 million in 1960, should start climbing again in 1961 and hit about $425 million.

Administrative and service building construction apparently will continue its upward trend in 1961, with a $700 million total. This segment registered $615 million worth of construction in 1960. Other nonresidential buildings construction should continue to show a gain in 1961, when it is expected to reach $550 million, compared to the $510 million mark in 1960.

**Military Facilities** Expenditures for military facilities in 1961 will be influenced to a great degree by the increasing requirements of the heavy ballistics missiles program. This increase will be offset to some extent by a decline in the regular military building programs. As a result, total expenditures are expected to approximate the $1.325 billion in construction recorded by this division in 1960.

**Sewer and Water Systems** Sewer construction seems to have caught up with current needs, and as a consequence it will probably decline in 1961 as it did in 1960. Smaller new projects appear to have replaced the larger ones so common in recent years. In 1961 sewer construction should total about $835 million; in 1960 it hit $890 million.

Construction of water facilities, on the other hand, will continue to rise in response to growing industrial and community needs. In 1960 this category amounted to $610 million; it should be up to around $690 million in 1961. The sewer and water systems division as a whole should record about a 2 percent gain, making a modest rise from $1.5 billion in 1960 to $1.525 billion in 1961.

**Public Service Enterprises** Last year (1960) public service enterprises showed a substantial increase of 18 percent in construction, which was worth $650 million. Construction in this division is expected to remain at just about the same level in 1961.

Because the major portion of the construction in this division comes from hydro-electric dams and similar projects, only a few sections of the United States benefit from construction of this type.

**Conservation and Development** Spending for conservation and development projects in 1961, which are expected to amount to $1.35 billion, will be almost double the 1955 rate of $700 million. It will also represent the sixth annual increase. New projects, as well as existing large continuing projects, provide a favorable outlook for this division.

**All Other Public** Contained in this group is all public construction not listed in any of the other divisions. It is a relatively

small division, but it has been gaining in importance in recent years. In 1960 it amounted to $225 million, a slight drop of 2 percent from the previous year. In 1961 it is expected to reach $250 million. This would be an 11 percent increase over 1960.

## HIGHWAY CONSTRUCTION

Highway Construction promises to increase $300 million over 1960, matching the $6 billion record total of 1959. The drop in 1960 construction follows the $400 million advance in 1959. The latter increase was related to anti-recession moves in 1959, when a step-up of spending resulted from the Federal Highway Act of 1958. Prospects in 1961 are strongly influenced by the fact that less funds need to be allocated for right-of-way purposes, thereby making more funds available for construction.

At the time of this writing, figures on actual mileage of highway construction were available for only the first three quarters of 1960; therefore, data that follow reflect information compiled through September 30, 1960.

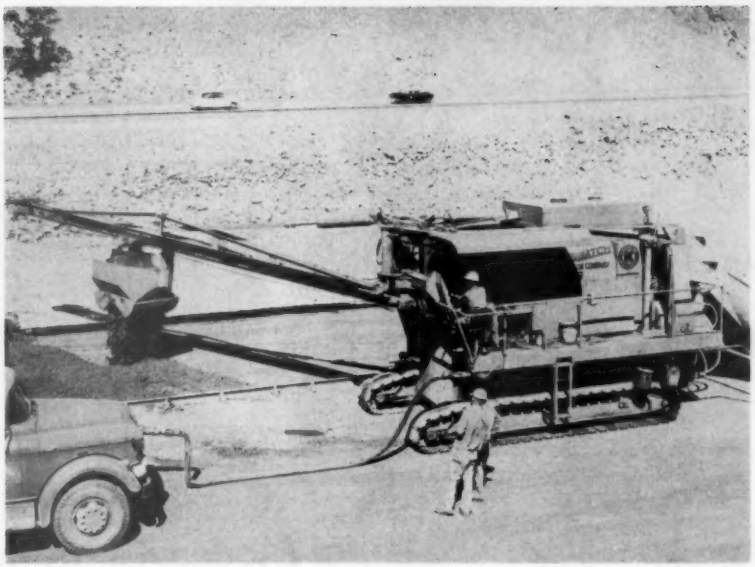
By the end of the third quarter of 1960 nearly 9,600 miles of the 41,000 National System of Interstate and Defense Highways was open to traffic, and construction was under way on another 4,600 miles, according to Bertram D. Tallamy, Federal Highway Administrator.

Of the 9,579 miles of Interstate System now in use by motorists, 4,235 miles had been completed to standards adequate for 1975 traffic, and 3,076 miles were improved to adequacy for present traffic but will need additional improvement to bring them up to standards for 1975. Toll roads, bridges, and tunnels incorporated in the system, as permitted by law, totaled 2,268 miles.

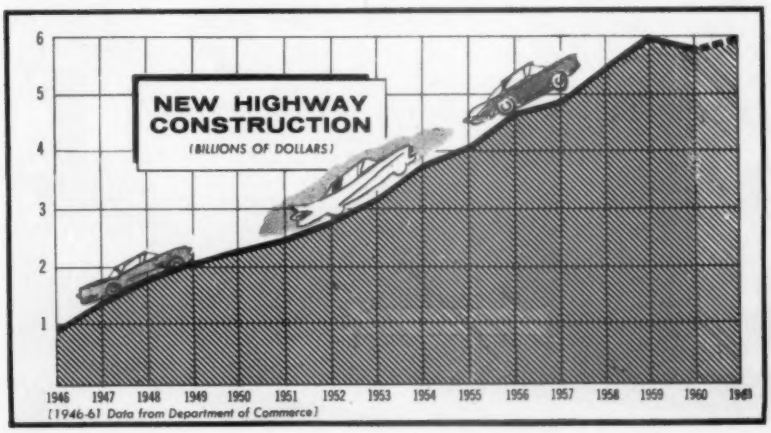
As of September 30, 1960, more than one-half of the mileage open to traffic was built or improved under the Federal-Aid Interstate program. Most of it was on the 90 percent federal/10 percent state sharing program launched in 1956. Work on the remaining 2,349 miles, other than tool facilities, was financed by the states and localities, mostly before 1956, under other programs, in many cases with Federal Aid.

In addition to the sections open to traffic, 4,575 miles were under construction with interstate funds, as of September 30, and engineering or right-of-way acquisition was in progress on another 9,993 miles. Therefore, some form of work was under way or completed on 24,147 miles of the 41,000-mile system. This represents almost 60 percent of the entire program.

The results of the Federal-Aid Highway program have been most inspiring to date. Although it has been in operation only a few years, its value is already evident. It is helping to rebuild and revitalize cities It is also stimulating the building of new cities. Two-thirds of the people in the United States now live in metropolitan areas. By 1970, three-fourths of the population will be urban. This results in a tremendous problem of moving people and goods in and out of the cities, and from one part of the metropolitan area to another. Foresight and planning on the part of our government has eased this problem considerably.



Concrete being poured on another stretch of Federal-Aid highway construction. After a slight drop in 1960, highway construction in 1961 will total about $6 billion.



REVIEW and FORECAST

# Cement:

## ■ 1960 Production, Shipments Down But Second Best in History-- Moderate Increase Expected in 1961

By WALTER E. TRAUFFER

THE PORTLAND cement industry in 1960, for the first time since 1957, failed to set new all-time records in production and shipments. Both categories dropped sharply below the 1959 records, but remained well above the previous record high of 1958. Shipments lagged behind the 1959 levels in every month up to October, when they went slightly ahead, and November is reported to have continued this upward trend, due partly to unusually good weather conditions and also to improvement in the general construction picture. Our figures are based on official government figures, which are now available for only the first ten months of 1960, and on estimates, believed to be conservative, for the last two months of the year, which are based largely on direct information from producers.

It is estimated that 1960 portland cement production in the United States and Puerto Rico amounted to about 320,000,000 bbl., and shipments totaled about 315,000,000 bbl. The value of shipments, about $1.05 billion, did not reach the 1959 record of $1.099 billion, in spite of fairly general but minor price increases during the year. These figures indicate

The Permanente Cement Corporation's new 1,700,000-bbl. plant in Hawaii was designed to blend in with the tropical surroundings. Concrete was used wherever possible in its construction. Office building, silos, kiln, and dust collector are shown.

decreases of about 5 percent in production, 6 percent in shipments, and 5 percent in value from the 1959 record totals of 333,767,000 bbl., 330,060,000 bbl., and $1.099 billion, respectively.

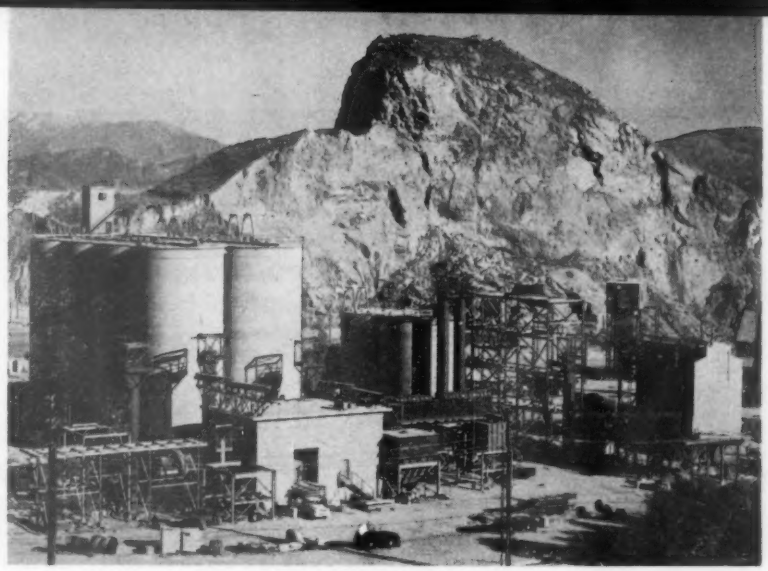
Official totals through October (ten months) of 1960 show that production was 271,689,000 bbl. —16,518,000 bbl., or 5.7 percent, below the corresponding 1959 period. Shipments through October were 272,187,000 bbl.—20,402,000 bbl., or 6.9 percent, below the 1959 period.

Stocks on hand at the end of October, 1960 were 28,725,000 bbl., considerably above the 23,912,000 bbl. of a year ago. The lowest point on cement in storage at plants is usually at the end of October, and if this is again the case, this would be the "highest low" in many years.

The expenditures of the industry for expansion and improvements were considerably higher in 1960 than in 1959 but not up to the all-time record years of 1956 and 1957. Eight new plants were built, and about 30 major expansion programs were completed at a total cost of at least $180 million. These projects involved about 23,000,000 bbl. of productive capacity, of which perhaps 18,000,000 bbl. was new capacity. At least 16 new kilns and 47 grinding mills were installed. Two old plants were permanently taken out of production during the year.

Present indications are that four new plants and at least 18 major expansion programs may be completed in 1961 at a cost of about $112 million. These projects involve an estimated total of 13 new kilns and 26 grinding mills and would have a total capacity of about 18,000,000 bbl. Of this about 13,000,000 bbl. would be added capacity.

It is estimated that the productive capacity of the industry reached a new high of about 434,000,000 bbl. annually at the end of 1960. an increase of more than 19,000,000 bbl. over the capacity of a year ago. By the end of 1961 capacity should increase about 13,000,000 bbl. to another new record of 447,000,000 bbl. As a result of this expansion, the industry in 1960 used only about 74 percent of year-end capacity. This compares with 79.5 percent in 1959, 77.3 percent in 1958, 78.2 percent in 1957, and 90.7 percent in 1956. Our estimates indicate that perhaps 72 percent of year-end capacity will be used in 1961.



The Riverside Cement Company's new 250,000-bbl. white cement plant at Crestmore, Calif., which is alongside the existing grey cement plant. Production is expected to begin in February, 1961. Limestone for both plants comes from a mine in background.

Prospects for 1961 are for a moderate increase in demand, perhaps 3 to 5 percent. Long-range expectations of producers are much more optimistic.

Profits for the first six or nine months of the year were down about 20 percent, but this was before the impact of the government ruling on percentage depletion, which was, incidentally, unanimously voted to be the most important development of the year. Costs were up moderately, a situation which is expected to be repeated in 1961. Prices rose slightly, and apparently the conditions in 1961 are not likely to encourage any but necessary minor local increases. As a result, little—if any—increase in profits is expected. A favorable development was a sharp decrease in imports.

The year was marked by an increased number of changes in ownership, five companies and 11 plants changed hands. Two companies with four plants were taken over by another cement company, the others by various types of large industrial complexes operating in other fields, including cement consumer industries. In all, 22 plants are now controlled by such companies. Cement plants owned by strictly user companies also increased during the year, and *vice versa*.

## CONDITIONS

Producers answering our questionnaires, who represented the bulk of the productive capacity of the cement industry, felt that 1960 began a period of transition in the industry, from a boom economy to one in which emphasis must be on marketing and improved manufacturing methods if profits are to be maintained. Many feel this to be a healthy condition which will give the producers time to consolidate their gains in preparation for future increases in demand, which most of them expect.

An Eastern producer says: "In our opinion, production and sales in 1960 are rather typical of what we are likely to be faced with in the years immediately ahead. . . . The industry now has added sufficient capacity (and will continue to do so), so that it will be normal to expect sales at a level below full capacity and in the range of, say, 80 to 90 percent of production. We consider this a healthy situation in that our customers can be assured of deliveries when needed and thus can plan accordingly. On our part, we are intensifying our efforts toward improving sales planning and toward developing in our sales

The Oklahoma Portland Cement Company's new 1,000,000-bbl. dry-process plant at Pryor, Okla., shipped its first cement in July.

force the ability better to anticipate and serve our customers' needs."

Another nation-wide producer says: "It is no news by this time that the heralded boom for 1960 and the sixties in general has failed to materialize. . . . Economic conditions, while perhaps not in a serious downtrend, have been uncertain throughout the year.

"With regard to construction, the housing program has not come up to expectations. In some parts of the country the highway program has been in the cement-consuming stage but in many others not. Nation-wide there has probably not been much more cement used on the highway program in 1960 than in 1959, although the prospect for 1961 in this regard is much better. Industrial construction maintained a good level through the first five months of the year, by which time the uncertainty of the economic situation apparently caused a cutback in capital outlay on the part of industry. . . . This trend seems to be changing, and the prospects for 1961 are somewhat better."

A producer in the Northwest says: "Generally speaking, I would say that these conditions are favorable and healthy. While the volume has been off slightly this year in some sections of the country, conditions could be regarded as satisfactory except for the adverse decision rendered by the U. S. Supreme Court on the subject of percentage depletion."

A California producer says: "From our point of view, the important trends apparent in 1960 were continuations of those that were apparent over the last five years, namely a continuing squeeze on profit margins and continued consolidation of cement companies both by other cement companies and other industries.

"The former trend has resulted in emphasis being placed on improved manufacturing methods and more particularly on the whole field of marketing. Added emphasis has been given to the promotion of concrete for highways and structures in particular, and we anticipate promotion of the latter to be accelerated in 1961. Attempts to help customers reduce cost and to effect cost reduction in cement operations themselves have resulted in such things as an accelerated move toward palletizing which, in our case, during 1960 increased threefold; toward better quality control, and toward the development of specific products for specific end uses."

## PROSPECTS

The general attitude of the industry toward 1961 is moderately optimistic with respect to demand, but less so about profits. Shipments are expected to be up 3 to 5 percent above 1960, to 325,000,000 to 330,000,000 bbl. Profits are expected to be down because conditions are not conducive to price increases which would compensate for expected cost increases. Labor costs are expected to go up because many union contracts come up for renewal during the year.

A large company operating east of the Mississippi River says: "As for next year's industry shipments—we view same on the optimistic side. If we are to have a business recession of any consequence, it will doubtless be of short duration and will not result in a violent business setback. Our own business research department has attempted to estimate the shipments of portland cement of all types which will move in the immediate future years from domestic plants. In doing so, the econometric approach was emphasized. Our economy, as measured by gross national product in constant dollars, has grown roughly at the rate of 3 percent since the turn of the century. From our studies, we have found that our industry is more closely correlated to gross national product than any other national indicator. Seasonally adjusted shipments have been improving for the past several months, and unless this expansion is to be of a very short cycle, 1961 should be a good year volume-wise.

"Lacking evidence to the contrary, we believe that 1961 is to be an average expansion year, followed by one of decline, beginning with the summer of 1962. . . ."

"The immediate future for our industry leaves much to be desired as there are many black clouds on the horizon. Even though volume should increase as predicted, it is doubtful that profits will parallel this betterment during 1961."

According to a nation-wide pro-

ducer: "The pressure of rising costs continued through 1960 and probably will not decrease in 1961. The price structure, again like many sectors of the economy, appears to be relatively more stable. To meet the cost-price squeeze, emphasis has been placed on capital expenditures which are designed principally to improve productivity and lower unit costs. The higher tax rate, due to the adverse ruling on percentage depletion, heightens the need for cost reduction to improve earnings. . . .

"In general, 1961 should be a year of greater cement consumption than 1960—perhaps by as much as 5 to 7 percent. As in previous years, the increase will probably not be felt throughout all parts of the country, but will be particularly noted in the "growth" areas. . . ."

A large company with plants, coast to coast, says: "Based on carefully made market studies, we are of the opinion that the cement business will be somewhat better in 1961 than it has been this year. The need for increased prices is becoming painfully apparent, but we are not hopeful of getting increases of any consequence, at least (not) during the first half of 1961."

A company in the Northwest says: "We anticipate that 1961 will be a very good year, probably a few percent ahead of 1960."

## PERCENTAGE DEPLETION

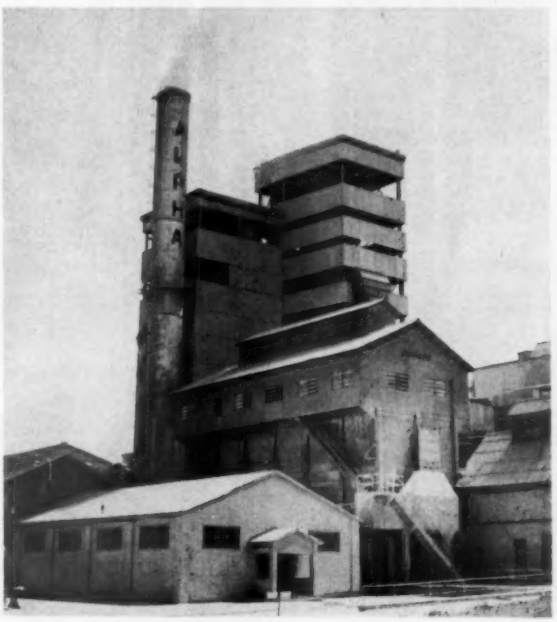
The comments below, gathered from cement producers throughout the country, clearly show that developments in percentage depletion had more impact than all others on the entire industry. It seems that almost all companies have elected to settle differences with the government on this factor after nearly 10 years of uncertainty and difficulty in arriving at an equitable percentage depletion computation. As indicated by many, the industry generally welcomes the clarification, despite the tax deficiencies that are faced, and the necessity for restatement of earnings in many cases.

A large national company says: "Perhaps the most significant development in our industry this year is the resolution of the percentage depletion problem. After eight Federal Circuit Courts had upheld the position of the taxpayer in calculating percentage depletion on the basis of finished cement, the Supreme Court on June 27, in a unanimous decision, reversed the Circuit Court rulings in the Cannelton case. While this case was not directly concerned with cement, but with the extraction and processing of clay and its finished products, the decision generally has been construed to mean that a cut-off point prior to manufacturing should be used rather than end-product value.

"At about the same time, on June 30, 1960, an amendment to the Internal Revenue Code was enacted to become effective January 1, 1961, fixing the cut-off point for the percentage depletion calculation at the introduction of cement-making materials into the kiln. This fixed for all future years the formula to be used by the industry, but left settlement for past years unresolved. On the last day of the 86th Congress, legislation was enacted giving cement companies an option to use this same cut-off point for all open past years (including 1960), or alternatively to await further clarification of the law through continuing litigation. It is my understanding that most companies have elected the kiln-feed cut-off point option for the past open years and, as mentioned, this cut-off point is now the law for future years.

"Since practically all companies for the years 1957, 1958, and 1959 had reported earnings on the end-product value, this means not only a restatement of earnings for those years but the making of substantial additional payments prior to February 28, 1961. Even for those companies who had not changed their method of reporting, the outcome of this whole question is costly in terms of dollar payment of tax deficiencies. The favorable aspects of the outcome are that the claims and counter-claims can finally be removed from cement company reports to the stockholders and that rules are fixed for future years. Perhaps another favorable aspect is that the kiln-feed cut-off method, being sounder and more reasonable, should make less attractive the entry into the cement business of outside interests, and (should) hopefully curtail the continued construction of unneeded capacity."

In commenting on reduced earnings for the year, one large company operating east of the Mississippi River said: "Many factors contribute to this result—the most important was our forced decision to settle our government tax dispute with respect to percentage depletion on the basis of kiln feed. Had we not done so, costly litigation, with the outcome greatly in doubt, would




A second suspension-type preheater was completed early in 1960 at the Cementon, N. Y., plant of the Alpha Portland Cement Co. It increased capacity about 200,000 bbl. annually.

have resulted, coupled with the possibility that this item might have been reduced to a basis of cost at the quarry floor . . . This body blow . . . was entirely unexpected, and has compelled some changes in our plans. It may project our improvement program into the future."

A large company operating nationally was more optimistic, stating: "Much has already been said regarding percentage depletion. Legislative clarification of the cut-off point for cement depletion will, of course, affect earnings in the future, as well as those in the recent past. Assurance of equitable and non-discriminatory treatment within the industry on the basis of the original understandings with the Treasury Department, going back to 1953, represents a solid gain for the industry for the future."

Another large company says: "Perhaps the most important development in 1960 was the settlement of tax disputes over the extent of depletion allowances. The statutes were amended by the last Congress to fix the value of cement-making minerals in the future at the point of introduction into the kilns. This new provision serves to put the industry back again on a sound basis. Among other things, it should serve to slow down the current invasion of the cement-making field by foreign capital, which has been attracted largely by the highly preferential income tax rate resulting from finished-product depletion.

"A further enactment in the closing days of the last Congress permitted cement companies to elect by November 15, 1960, to settle current tax disputes over the extent of depletion allowances by applying the Internal Revenue Service ruling issued in 1953. This ruling provides the same basis of allowances we have consistently used throughout the years and on which the income tax liabilities reflected in its accounts have been determined. So far as we know, the cement industry elected, without exception, to apply the Internal Revenue Service ruling issued in 1953, establishing the so-called kiln-feed cut-off point as the basis for calculating percentage depletion allowances for past years."

A Midwestern firm writes: "As for percentage depletion, maybe the less said the better, and you already know the story. We asked for what we got, and it could have been worse."

## PROFITS, PRICES, COSTS

The portland cement industry in 1960 had another profitable year but considerably less so than in 1959, when shipments were at an all-time high level. The volume of shipments, about 314 million bbl., was down about 6 percent, and this, with only a slight increase in prices, undoubtedly held the value of shipments well below the all-time record of $1,099,000,000 set last year. The estimated sales of about $1,050,000,000, however, remain well ahead of the previous record of $997,701,000 in 1958 and the earlier record of $940,020,000 in 1956. The average price in 1960 was apparently about $3.30 per bbl., compared to $3.28 in 1959, $3.25 in 1958, and $3.18 in 1957.

Costs again went up considerably

The digital control computer (left) at the Riverside Cement Company's Oro Grande, Calif., plant, which controls raw material blending and is being adapted to the control of kilns and other equipment. Also shown are the kiln control cabinet with TV monitors above, the tape punch machine, etc.

in 1960 as prices of nearly every item entering into costs rose substantially. Labor costs, however, were fairly stable as this was an in-between year for most of the 2-year union contracts which will come up again in 1961. The greater efficiency and economy in production due to new plants and improvement programs probably had little effect on costs this year because of the lower ratio of production to capacity.

Profits in 1960 were undoubtedly down considerably from 1959, as nearly as we can determine from incomplete data for 9 months (in some cases only 6 months) of the year. As always, there was considerably variation from company to company; but all companies reporting, including most of the larger ones, had substantial decreases in profits, averaging about 21 percent. There is no reason to believe that there was any material change in the last quarter of the year.

Prospects for 1961 indicate a possible moderate increase in profits based on an expected higher level of construction. Costs are sure to go up again, especially labor, and no substantial price increases are expected.

Cost absorption through maintenance of present prices appears to be shaping up as the policy which most cement companies will pursue for 1961. The growing excess of capacity over demand, with the resulting competition for business, is not conducive to widespread price increases; the foreign cement being sold at lower prices is exerting a depressing effect out of all proportion to the volume involved; and little increase in sales is expected in 1961.

As a result of this situation, most cement companies are holding up their final decisions on 1961 prices until conditions become more clearly defined. Several large companies have definitely committed themselves to holding the price line for all or a part of the year. Of the few companies which are known to have announced price increases most have been in the Middle West or South, and these advances have been only 5 or 10 cents per bbl., not enough to cover increased costs. One company on the West Coast has announced a 25 cent increase. Late in the year prices were cut $1 per bbl. in Alaska.

A producer operating east of the Mississippi River states: "Labor will endeavor to exact higher rates upon the expiration of the two-year contracts which expire May 1 of next year.

"Whatever should be granted will necessarily reduce our margin of profit."

According to a producer in the Middle West: "The excess of capacity over demand has caused, and will continue to cause, softening of prices. This does not necessarily occur in terms of stated dollars per barrel, but rather by the offering of extra services at no commensurate price increase. This softening of prices, then, together with the percentage depletion developments, exerts considerable pressure on profits, particularly for marginal productive capacity.

"These factors cause one of two outstanding developments. Those companies which have adequate financial backing will invest in capital improvements that are designed to reduce production costs. Those firms which are not so fortunate begin to cast about in the direction of mergers, which activity will continue, of necessity. The mergers will proceed both vertically and horizontally, since they are enforced by survival and fortification considerations."

The head of another central firm says: "Some of the cost increases we have had this year were self inflicted and, I believe, misguided—more trucking installations (at least $1 million per plant) and higher packing costs, producing no increase in consumption; much finer ground cement; started as a sales aid for individual plants or companies, with substantial capital cost, higher grinding cost; no increase in consumption but more complaints of its misbehavior from customers—a double hurt.

A company in the Northwest says: Labor supply appears to be stable. Demands for unearned increases in pay continue to be made and accepted by the industry even though under present conditions there is little hope of price increases. This cannot go on much longer without seriously jeopardizing the solvency of the industry."

## 1960 CAPACITY INCREASE

The increase in productive capacity of the portland cement industry in 1960 was greater than in 1959 and about equalled 1958, but did not reach the records set in 1956 and 1957. It is estimated that at least 23,000,000 bbl. of capacity was installed in 1960 in the form of six completely new plants, two essentially new plants, and at least 30 major plant expansions. At least 16 new kilns and 47 new grinding mills were installed. The cost of these additions alone was well over $180 million, and other improvements of less individual importance would substantially increase this figure.

Some of this capacity replaced existing facilities, but most of it—we estimate about 20,000,000 bbl.—was new capacity. This compares to the record 34,143,000 bbl. added in 1956, the 30,944,000 bbl. in 1957, the 22,000,000 bbl. in 1958, and the 17,600,000 bbl. added in 1959, according to Bureau of Mines figures. With two plants totaling 2,600,000 bbl. capacity taken out of production during the year, the actual capacity increase was about 17,400,000 bbl. As the official capacity of the industry at the end of 1959 was 417,000,000 bbl., the capacity at the end of 1960 should be about 434,000,000 bbl.

**New Plants** The eight new cement plants completed in 1960 are those of the Century Cement Corp., Rosendale, N. Y.; Dundee Cement Co., Dundee, Mich.; Hawaiian Cement Corp., Oahu, Hawaii; Kosmos Portland Cement Co.. Kosmosdale, Ky.; Northwestern States Portland Cement Co., Mason City, Iowa; Oklahoma Portland Cement Co., Pryor, Okla.; Permanente Cement Co., Oahu, Hawaii; Texas Industries, Inc., Midlothian, Tex. These eight plants involve a total of nine new kilns and 20 mills, a total capacity of about 13,000,000 bbl. annually. As all of these except two are completely new plants at new locations, and those two are additions rather than replacements, this is practically all new capacity. The announced cost of building these plants totalled $92,000,000. The two plants

known to have been taken permanently out of production during the year were those of the Medusa Portland Cement Co. at Bay Bridge, Ohio, with a capacity of 1,150,000 bbl.; and the Lehigh Portland Cement Co. at Ormrod, Pa., with a capacity of 1,430,000 bbl.

**Plant Expansions** At least 30 portland cement plants are known to have completed important expansion and/or improvement programs in 1960. Included in these were 7 new kilns and 27 grinding mills. These 30 plants, along with many others having smaller programs, are known to have installed at least 10,000,000 bbl. of capacity during the year, at a cost of over $88 million. Of this total, perhaps 7,000,000 bbl. was new capacity, not replacement.

**Capacity** The total capacity estimated to have been installed in 1960—23,000,000 bbl.—and the actual added capacity of about 20,000,000 bbl. compares with the actual capacity increase in the 12 months ending in September, 1960. This increase, according to the U. S. Bureau of Mines, was 16,835,000 bbl. During 1959 about 79.5 percent of the year-end capacity was used, compared with official figures of 77.3 percent in 1958, and 78.2 percent in 1957. With the estimated capacity of the industry at the end of 1960 about 434,000,000 bbl. and output for 1950 about 320,000,000 bbl., only about 74 percent of the year-end capacity was used. Some decrease in the percentage of utilization is expected in 1961 as the substantial amount of capacity being added will probably exceed the moderate increase in sales expected.

## FUTURE INCREASES

The information available at this time on the amount of capacity to be added to the industry in 1961 is necessarily incomplete, and only rough estimates are possible. The four new plants scheduled for 1961 completion are in various stages of construction, and at least three more are now scheduled for 1962. At least 18 major expansion programs and many smaller ones are known to be under way for 1961 completion. There are undoubtedly many others not yet made public, and others not yet started will be completed before the end of the year.

These projects involve 13 new kilns and at least 26 mills, a total capacity of about 18 million bbl., and a cost of about $112 million. It is thought that about 13 million bbl. of this capacity will be additional, not replacement of older equipment. Some of the work scheduled for completion may be delayed or postponed, but this is probably balanced by the work not yet started or known to us. Adding this 13 million bbl. to the estimated 434 million bbl. capacity at the end of 1960 indicates a capacity of about 447 million bbl. at the end of 1961.

**New Plants** The four new plants scheduled to be completed in 1961 are: Calaveras Cement Co., Redding, Calif.; Dewey Portland Cement Co., Tulsa, Okla.; General Portland Cement Co., Tampa, Fla.; and Riverside Cement Co., Crestmore, Calif. Two of the above are completely new plants at new locations, one is a basically new plant alongside an older operation; and the other is a white cement plant. These four plants will have a total of four kilns and 12 grinding mills and a combined capacity of about 6,000,000 bbl. annually. They will cost about $48 million.

There are three new plants scheduled for completion in 1962—Ideal Cement Co., Wilmington, N. C.; Louisville Cement Co., Logansport, Ind.; and Permanente Cement Corp., Anchorage, Alaska.

There are several other proposed plants. Alaska Portland Cement Ltd., a $15,000,000 corporation, was formed for the purpose of building a plant there. Universal-Atlas Cement Co. is designing a proposed plant on Grand Bahama Island, a British possession, which would ship into this country. Another plant is rumored on the Ohio River in Kentucky, not far from Cincinnati. The Nez Perce Cement Corp. was incorporated early in the year for $5,000,000 capital stock. The proposed plant would be built at a quarry near Lewiston, Idaho.

**Plant Expansion** There are known to be 18 major expansion programs now under way for completion in 1961. These involve a total of nine new kilns and 14 mills and about 12 million bbl. of capacity of which about 6 million bbl. will be new capacity. The total cost is estimated at about $64 million. Unknown or unscheduled work should add considerably to these totals.

## CONSOLIDATIONS

**Within the Industry** There were only two instances during 1960 of a change in ownership wholly within the cement industry. The Marquette Cement Mfg. Co. has just completed negotiations to take over the assets of the North American Cement Corp. and the Green Bag Cement Co. North American has plants at Catskill and Howes Cave, N. Y., and Security, Md., with a total capacity of 6,300,000 bbl. annually. Green Bag's plant on Neville Island, near Pittsburgh, Pa., has a capacity of 2,000,000 bbl. annually.

The Columbia Cement Corp., was formed as a wholly owned subsidiary of Columbia-Southern Chemical Corp., (itself a subsidiary of the Pittsburgh Plate Glass Co.) of which it was formerly a division. Columbia has a plant at Zanesville, Ohio, and completed a new 1,500,000-bbl. plant at Barberton, Ohio, late in 1959.

**Outside the Industry** The absorption of cement companies by large outside companies continued at an accelerated pace in 1960. The Dewey Portland Cement Co. was taken over early in 1960 by the American-Marietta Corp. as a separate division. Dewey has plants at Davenport, Iowa, and Dewey, Okla., with a combined capacity of 5,500,000 bbl. and a new 1,250,000-bbl. plant near completion at Tulsa, Okla. A-M differs from the others in this group in that it is also a large operator of concrete products plants over a wide area.

The Allentown Portland Cement Co., with plants at Evansville and West Conshohocken, Pa., was taken

over late in the year by the National Gypsum Co. It will be operated as a subsidiary.

The Diamond Portland Cement Co., with two plants at Middlebranch, Ohio, and a total capacity rated at 3,000,000 bbl. was taken over late in the year by the Flintkote Co.

**Trend to Diversification** The interrelationship between cement companies and user industries such as ready-mixed concrete and concrete products also grew during the year. American-Marietta (see above) is also in this category. Early in the year the Lone Star Cement Corp. took its first step in this direction by acquiring the Pioneer Sand & Gravel Co. of Seattle, Wash., one of the largest building material companies in the Pacific Northwest. Pioneer operates a large sand and gravel plant and four ready-mix plants in the Seattle area. Lone Star operates two cement plants (Superior Division) at Seattle and Concrete, Wash.

Texas Industries, Inc., a very large operator of sand and gravel, crushed stone, lightweight aggregate, ready mixed concrete, and concrete products plants in Texas and neighboring states, late in the year put into operation a new 1,400,000-bbl. cement plant at Midlothian, near Dallas, Tex. According to company officials, about 60 percent of the cement produced will be used in its own operations in north-central Texas; the balance will be sold.

The Colonial Sand & Stone Co., Inc., which built a 900,000-bbl. plant (Hudson Cement Corp., Kingston, N. Y.) in 1958, expanded it to 2,000,000 bbl. in 1960. Most of the cement produced is going to its own extensive ready mixed concrete plants and other operations in New York City and the surrounding area.

Ponce Products, Inc., Ponce, Puerto Rico, has purchased a further interest in Maule Industries, Inc., a large producer of ready mixed concrete, concrete products, and aggregates in the Miami, Fla., area. The funds will be used to build new aggregate and ready-mix plants west of Miami. Ponce owns two cement plants in Puerto Rico which ship much of their output to Florida's east coast.

A trend which grew rapidly in the last year was the absorption, by large industrial complexes operating cement and other plants, of companies producing other nonmetallic minerals such as crushed stone, sand and gravel, lime, and gypsum, as well as such consumer (cement) industries as ready mixed concrete and concrete products. This is a definite move toward diversification, but it may be significant for other reasons.

**Comments** On this subject an eastern producer says: "It is our feeling that the widespread trend toward consolidations of cement companies and the absorption of individual companies by large outside individual firms may not, over the years, prove as attractive as a great many people now seem to think. Certainly, chain companies enjoy certain operational advantages and, to some extent, sales advantages; but as against this, by the very size of their organization, they lose flexibility. With respect to ownership by outside individual firms, production flexibility is lost, to an even greater extent. The cement divisions are bound to suffer severely through the lack of intimate knowledge of the industry among the top executives.

A large national company writes: "The nature of the cement business favors multiplant companies. Having several plants at different locations enables a company to reduce the hazards of localized adverse weather, competition from imports, or oversupply in a given market area. I rather expect to see a continuation of the trend toward multiunit organizations. On the subject of entry of large diversified companies into the cement business, I do not view this with alarm . . ."

"I do not, however, subscribe to the philosophy of integration exemplified by the acquisition of large cement users by producers of cement or the entry into the cement manufacturing business by large users of cement. The result in either case is the establishment of captive accounts which distorts the normal buyer-seller relationships.

A large company operating east of the Mississippi River states: "It is our conviction that it is illogical, imprudent, and naive for cement-producing companies to integrate by the acquisition of cement-consuming companies. The ready mixed concrete products business calls for totally different skills, abilities, and policies from (those of) cement manufacturing companies.

"The economic factors are totally at variance, and we believe that such combinations will result, on the one hand, in the demoralization of the consuming industry by the disruption of normally competitive conditions; and on the other hand, it will lead to the abandonment of the fundamentally sound objectives of quality, service, and low cost of the cement-producing companies."

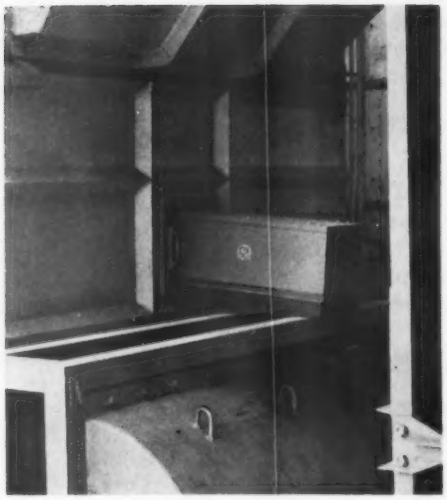
A large West Coast company states: "There certainly seems to have been some trend toward consolidation of cement companies, as well as the merger of cement companies by building material manufacturing companies. It . . . is becoming more difficult for single plant companies to compete, to carry on adequate research, and to hire qualified management. Therefore, for these reasons alone we might expect this trend to continue. The absorption of customer companies has, of course, occurred in some instances, but whether this is a trend or not remains to be seen. The same applies to the construction of cement plants by customer companies."

A producer in the Northwest says: "The trend toward the consolidation of cement companies . . . appears to continue. . . . There appears to be points both for and against this trend. The larger companies have a better opportunity to withstand adversity than the smaller ones. There is still a place for the well managed small company."

## TRENDS IN MANUFACTURE

There were apparently no outstanding new developments in the technology of cement manufacture during 1960, but steady progress was made in the application of proved methods and equipment leading to automation and better process control. It became increasingly apparent during the year that

the continuing expenditures for modern new plants and expansions using the latest in equipment and controls were justified by the resulting improved and lower-cost products. There was a continued acceleration in the trend toward larger kilns and grinding mills; installations of glass bag kiln gas dust collectors; and use of TV, radioactive measurement, X-ray spectrographs, and other advanced devices. There was also a continuation of the trend toward more specialty cements, to serve a greater variety of uses, and toward provision of facilities for truck loading.



Location of TV cameras at the discharge end of grate clinker coolers gives burner better control of kiln operation at Lone Star Cement Corporation's Lake Charles, La., plant.

**Automation and Control** The trend toward greater automation and centralized control has now reached the point where it is standard practice in nearly every new plant or major expansion. Most such operations are now using central control rooms for each major department and in some cases a single control room for the entire plant. One large company now has three plants, each of which is operated from one centralized control room. In one this center controls all operations from quarry to finished product storage; in another it controls every phase except raw material unloading and packhouse loading; in the third it controls all phases except the crushing plant. Another large new plant has four main control centers in one of which co-ordination is established.

Continuing attention is being given to increased accuracy and consistency in proportioning, blending, sampling, homogenization in storage, and quality control in general.

The electronic process-control digital computer installed at a West Coast plant early in 1959 is reported to be doing satisfactorily its primary job of controlling a modern raw material crushing, storage, and blending system; and its application to kiln control and other processing stages is progressing. Another West Coast plant is putting in what is practically a complete new plant alongside an older one; and this installation will have an electronic process control computer.

Other companies are putting in systems which approximate the same results, notably one large cement plant in the Middle West. This company has a punch card accounting setup for production quality, quantity, and efficiency control. This setup is being used in combination with semi-automatic plant control and is also used for official accounting records, etc.

**Kilns and Mills** The outstanding development in kilns and burning methods was a continuation of the trend to larger-diameter and longer kilns for greater efficiency and economy. One plant, completed early in 1960, has two 16- by 15½- by 16- by 460-ft. kilns —each rated at 8,000 bbl. per day —and no other new plant built, under construction or planned, has anything approaching this size. A number do have kilns considerably larger than had previously been considered practical, ranging up to 13½- by 12- by 425-ft. (dry process) and 13- by 14½- by 450-ft. (wet process).

It is interesting, however, that many of the plant expansions completed, under construction, or planned involve kilns much larger than those originally installed and larger than most of the new plant installations. Examples are kilns 15 by 13 by 490 ft., 16½ by 600 ft., and 15 by 460 ft. In both categories nearly half of the kilns involved are multiple diameter. Most of the smaller new kilns were for small plants serving the less densely populated areas, and one was for a new white cement plant.

There were no new types of kilns put on the market during the year, but several types other than the regular rotaries made some progress. An installation of a vertical type of portland cement kiln widely used in Europe and other parts of the world will be in operation soon. Installations were made during the year of some of the other types available such as the Allis-Chalmers AC combination grate and rotary kiln, and the Fuller-Humboldt suspension-type preheater.

The trend toward larger grinding mills also continued in 1960, but except for one operation, where 3,000-hp. mills are being installed, this seems to have been held to the maximum of 2,500 hp. On the other hand, there are few installations known or planned requiring less than 1,250 hp. Sizes range up to 12- by 36-ft. and 9½- by 43-ft. One plant has had successful experience with an 8- by 15-ft. rod mill as part of a 2-stage raw-grinding setup. This replaced two 8- by 12-ft. preliminary tube mills, incidentally with a reduction of 300 hp.

**Other** There has been some increase in the application of some of the newer developments, such as radiation density meter control of slurry in wet-process plants; the use of radioisotopes for various control purposes; and the use of TV. One was the use of radioactive rays to control clinker depth in shaking-type clinker coolers. These radioactive gauges are now being

experimented with for measuring the flow of slurry, clinker, etc. Another was the use of TV at the clinker cooler to keep the kiln burner informed of conditions needing correction. The use of the X-ray spectograph for quick analysis of raw materials for blending is also increasing.

Cement storage facilities are being built at a continuing high rate, but in the last year a growing percentage of such construction has been for truck shipments. One plant has its bag packers under the interstices of the cement silos, with retractable belts to trucks or cars. Bulk cement is loaded direct or by conveyors from these silos.

Some of the silos are being built to provide storage for the growing number of special types of cement made for special uses. The number of cement distributing stations has also increased, apparently to meet growing competition. This is regarded by some as another increased cost which will be passed on, as it costs from 12 to 20 cents per bbl. to place cement in storage bins and again into trucks.

Palletizing of bagged cement shipments has been a growing practice, but it was only in the last year that the first automatic palletizing system was installed in a cement plant in this country. Other such installations are now being made.

## MARKET DEVELOPMENT

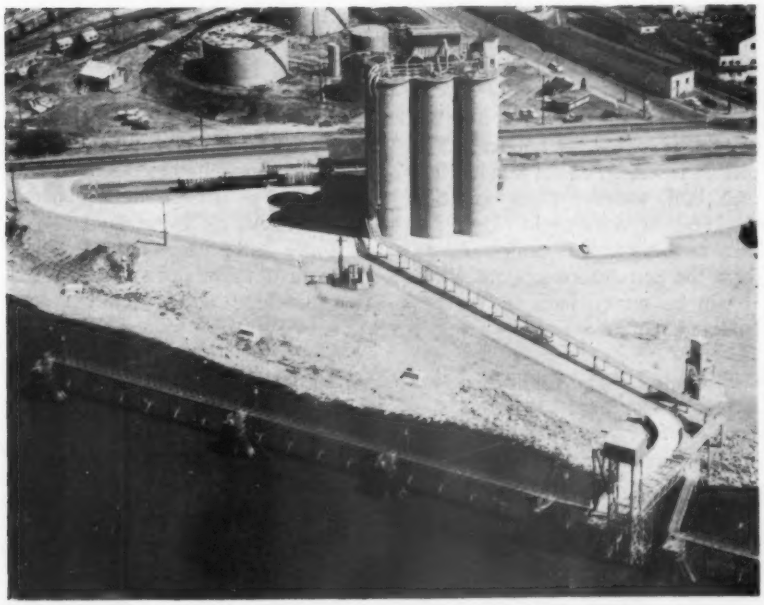
The general feeling among producers is that the industry has in the last few years done a better job of marketing than in the past, chiefly because emphasis has been less on production and plant expansion. It is felt that the competitive position of portland cement concrete has improved at an accelerating pace. New uses for concrete have been developed and will continue to be developed, and the potentialities of some, like prestressed concrete, have hardly been touched.

A large firm operating east of the Mississippi River said: "The excess producing capacity of the industry . . . has not of itself increased the use of cement nor encouraged development of new uses for cement. The spectacular improvement in the competitive position of portland cement concrete which has come about in recent years at an accelerating pace is the result of research and development programs which have been under way for eight or ten years or more, and which began to bear real fruit during the mid-fifties when there was actually a shortage of cement. There can be little doubt, however, that the further fruits of basic and applied research and development in such areas as ultimate strength design methods for structures, rational design for pavements, and vastly improved working knowledge in prestressed concrete and reinforced concrete, using new high-tensile-strength steel, will broaden the scope and extent of cement use and improve its competitive position."

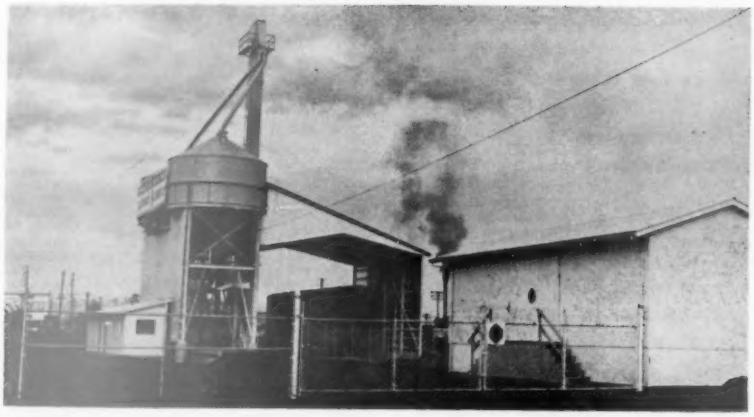
A small company in the Central area says: "Not . . . the greater supply of cement but the very effective, rapid development of precast, pre- and post-stressed units, the really beautiful as well as effective roofs, curtain walls, and decorative effects now attainable with concrete for structures of all kinds, are making cement stronger competitively (compared) with other building materials. And the results of the A.A.S.H.O. tests, when properly presented, certainly should substantially increase paving yardage"

A large West Coast firm says: "It would not appear that the ample cement supply in itself has increased the use of cement over competitive building materials, nor has it encouraged the development of new uses for cement. It takes promotion, acceptance by engineers, architects, and the general public acceptance to increase the use of cement over other materials."

A California producer says: ". . . Evidence indicates (that) new ways of utilizing cement have enabled us, over the past several years, to increase our relative participation in the building materials field. However, cement itself is such a small part of total concrete cost that adequate supply and corresponding relatively low costs do not necessarily increase its usage. The use of more readily available design criteria and computers, we believe, is having an extremely beneficial effect on the relative position of cement and concrete as these design and engineering tools result in more positive design criteria and less time-consuming and engineering costs."



Ideal Cement Company's new deep-water terminal on the Columbia River at Vancouver, Wash., is typical of many recent installations in this country. This serves the Vancouver-Portland area.



The Calaveras Cement Company's new bulk cement transfer plant in Springfield, Oreg., supplies southern Oregon from the San Andreas, Calif., plant. This is one of many such installations for track haulage.

## PLANT EXPANSIONS

**Alpha** The Alpha Portland Cement Co. spent over $4,000,000 during the year on expansion and modernization of its plants. This is a part of a program announced in 1959 to spend an estimated $50,000,000 in six years on Alpha's eight plants. A $1,000,000 modernization completed at the Cementon, N.Y., plant included a preheater which is expected to increase capacity by 200,000 bbl. Unit coal mills were installed at the Martins Creek, Pa., plant at a cost of $800,000. Late in the year Alpha opened a new distribution center at Covington, Ky. Deliveries are made by tank-type trailers.

Expenditures in 1961 are expected to total about $5,000,000 and will include over 500,000 bbl. of new cement storage capacity at the Catskill, N.Y., LaSalle, Ill., and Birmingham, Ala., plants.

**Allentown** The Allentown Portland Cement Co. early in 1960 completed the installation at its Evansville, Pa., plant of a 9- by 128-ft. Traylor rotary kiln with a Fuller-Humboldt pre-heater.

**Ash Grove** The Ash Grove Lime and Portland Cement Co. is reported to have completed the first step in a complete new plant modernization program at its Chanute, Kans., plant. Included are a 500-t.p.h. crushing department, a 120- by 420-ft. crane storage, a stone drier, bulk loading silos, etc. This work was designed and built by the Macdonald Engineering Co.

**Bessemer** The Bessemer Limestone and Cement Co., Walford Station, Pa., plans a 6-year, $12,000,000 program that includes a new cement plant with larger and more efficient equipment.

**Calaveras-Flintkote** The Calaveras Cement Co., division of the Flintkote Co., is reported to be progressing with the construction of its new 1,500,000-bbl., $14,000,000 dry-process plant near Redding, Calif. Major equipment includes a 13½- by 12- by 425-ft. kiln and three 13- by 17-ft. ball mills—all Allis-Chalmers. Completion is scheduled for late in 1961.

A bulk transfer plant was built in 1960 at Springfield, Oreg. At present this receives cement by rail from the San Andreas, Calif. plant. It will be served later by the new Redding plant.

**California-Arizona** The California Portland Cement Co. is reported to be making progress on a $7,000,000 expansion and improvement program at its Colton, Calif., plant. Included are a $2,000,000 dust-collection system (of the glass-bag type), two new 15- by 13- by 490-ft. Allis-Chalmers kilns with a total capacity of 4,000,000 bbl., new raw- and finish-grinding departments (two 13- by 17-ft. raw ball mills and two 13- by 21-ft. finish mills, also Allis-Chalmers), storage silos, and bulk loading facilities. There will also be a General Electric process-control computer. Completion is expected in 1962.

At the Rillito, Ariz., plant of the subsidiary Arizona Portland Cement Co. a finish mill, storage silos, and loading facilities were completed.

**Century** The Century Cement Manufacturing Co., Rosendale, N.Y., is reported to have just put in operation its new vertical kiln cement plant.

**Dewey** The Dewey Portland Cement Co. (division of American-Marietta Corp.) plans to have completed its new 1,250,000-bbl., $12,000,000 plant near Tulsa, Okla., in full operation about March 1, 1961. Major equipment includes a 12- by 425-ft. kiln and three 1,500-hp. mills—all F. L. Smidth. A $1,000,000 dust collecting system is now being installed.

**Dundee** The plant of the year was the new 5,000,000-bbl., $25,000,000 operation of the Dundee Cement Co. at Dundee, Mich., which went into operation in January. Major equipment includes two 16½- by 15- by 16½- by 460-ft. F. L. Smidth kilns—each rated at 8,000 bbl. per day— five 12- by 36-ft. Nordberg mills—two for raw- and three for finish grinding—two 10- by 70-ft. Fuller horizontal grate clinker coolers, and Buell electrostatic precipitators. Dundee is a subsidiary of Holderbank Financiere Glaris, S.A., of Switzerland.

Later in the year Dundee opened new distribution and service centers in Cleveland and Cincinnati at a cost of $400,000 each.

**General** The General Portland Cement Co. is planning for 1961 completion the important expansion program under way at its Tampa, Fla., plant. This will increase its capacity 3,000,000 bbl. to 7,000,000 bbl. annually. Major equipment includes a 16½- by 600-ft. kiln, and four 12- by 36-ft. Compeb mills driven by 3,000-hp. motors.

**Giant** The Giant Portland Cement Co. is progressing with the $4,000,000 expansion program at its Harleyville, S. C., plant which will increase its capacity by 1,100,000 bbl. to 4,000,000 bbl. annually. Additions include a fourth kiln (11 ft. 3 in. by 425 ft.), and new 130,000-bbl. bulk loading silos. This work is being done by the Macdonald Engineering Co. At the Egypt, Pa., plant the packing department is being rebuilt, with provisions for truck loading.

**Glens Falls-Flintkote** The Glens Falls Portland Cement Co., a division of the Flintkote Co., early in 1960 completed a $3,000,000 new finish grinding department at its Glens Falls, N.Y., plant. Equipment included two 10- by 34-ft. Allis-Chalmers Compeb mills with 1,500-hp. motors, air separators, etc. Recently completed is a $1,250,000 packaging and bulk-loading department.

**Green Bag** The Green Bag Cement Co., recently taken over by the Marquette Cement Mfg. Co., built a new $250,000 distributing plant near Marietta, Ohio. A 4,700-bbl. self-unloading barge hauls cement from the plant on Neville Island, near Pittsburgh. A cement unloading dock is being built on the Monongahela River at Fairmont, W. Va.

**Hawaiian** The Hawaiian Cement Corp., partly owned by the American Cement Corp., began the production of cement in August at its new 1,000,000-bbl., $12,000,000 plant at Barber's Point, Oahu, Hawaii. Major equipment includes a 10- by 12- by 240-ft. kiln and two 1,250-hp. mills—all F. L. Smidth.

**Hercules-American** The Hercules Cement Co. division of the American Cement Corp. is reported to be making a $1,000,000 glass bag dust-collector installation at its Stockertown, Pa., plant.

**Hudson** The Hudson Cement Corp., a wholly owned subsidiary of the Colonial Sand & Stone Co., is reported to have just completed an extensive program at its plant near Kingston, N. Y. The original 900,000-bbl. plant, completed late in 1958, was expanded to a capacity of 2,000,000 bbl. annually. The new equipment includes an 11½- by 425-ft. kiln and 9½- by 43-ft. raw and clinker mills —all Kennedy-Van Saun. Colonial uses much of the output for its own ready mixed concrete operations in the New York metropolitan area and markets the excess. This expansion is reported to have been made to provide more cement for other users.

**Huron-National Gypsum** The Huron Portland Cement Co., a subsidiary of the National Gypsum Co., in 1960 added a seventh vessel to its fleet of Great Lakes cement and coal carriers. This vessel, the *H. R. Schemm*, is a former oil tanker 500 ft. long which is being converted to a self-unloader with a capacity of 53,000 bbl. of cement. It is expected to go into service in 1963.

Just completed at the Alpena, Mich., plant is a clinker-grinding addition with a capacity of 7,000 bbl. daily. The 11- by 38-ft. Kennedy-Van Saun clinker-grinding ball mill is driven by a 2,500-hp. motor. Other work under way includes a boat slip and harbor-deepening project and new shale-handling facilities.

Late in the year plans were announced for a new addition consisting of a 15- by 460-ft. Allis-Chalmers kiln with a capacity of 5,250 bbl. daily, a 7½- by 85½-ft. horizontal articulated air quenching clinker cooler, and related equipment. Completion is planned for January, 1962. This addition will give the plant a capacity of 14,000,000 bbl. annually.

**Ideal** The Ideal Cement Co. late in 1960 completed the $7,000,000 expansion of its Tijeras, N. M., plant which doubled its capacity to 2,500,000 bbl. annually. A second (duplicate) 11- by 12- by 375-ft. Allis-Chalmers kiln and two 11½- by 17-ft. ball mills were added.

At the Devil's Slide, Utah, plant Ideal completed a $2,000,000 project which provided new cement storage and bulk loading facilities.

New storage and packing facilities were added to the Superior, Nebr., plant at a cost of $2,000,000.

Construction has not yet begun on the new 1,500,000 bbl., $14,000,000 plant at Clarkston, Wash., which was originally expected to be in operation in 1963.

Ideal completed several other steps in its continuous expansion and improvement program during the year. A Marine Operations Department was formed following the addition to the firm's fleet of an 84,000-bbl. capacity ship, the *S. S. Keva Ideal* for use in the Gulf of Mexico. The *S. S. Cornell*, a 14,000-long-ton capacity tanker, is being refitted to carry cement, limestone, gypsum and other products from its Redwood City, Calif., plant. A new $1,700,000 terminal was completed at Vancouver, Wash., consisting of silos and a packhouse.

A new $3,000,000 terminal being built in Seattle, Wash., will consist of silos, a packhouse, and a wharf.

At its Boettcher, Colo., quarry Ideal added a $500,000 track-mounted dragline for stripping use. This machine weighs 300 tons, not including the 9½-cu. yd. bucket.

Construction is expected to begin soon on a new 1,500,000-bbl. plant at Wilmington, N. C. Marl will be used as a raw material. Water shipment by barge is planned, and distribution facilities will be built at Wilmington and Fayetteville, N. C.

**Keystone** The Keystone Portland Cement Co., Bath, Pa., has completed the construction of six combination bulk car- and truck-loading silos with 20 compartments and a total capacity of 110,000 bbl. This work was done by the Macdonald Engineering Co.

**Kosmos-Flintkote** The Kosmos Portland Cement Co., a division of the Flintkote Co., is reported to have just completed an addition to its plant at Kosmosdale, Ky., which is virtually a new plant. Capacity was increased, by 1,000,000 bbl., to 3,200,000 bbl. annually. New equipment included two 11-ft. 6-in. by 17-ft. 8-in. raw mills, a 9- by 90-ft. clay dryer, 11- by 460-ft. dry process kiln and a 6- by 20-ft., 2-compartment mortar mill—all Traylor.

**Lehigh** The Lehigh Portland Cement Co. in June, 1960, had completed a $7,500,000 modernization program at its Alsen, N. Y., plant. Four old 125-ft. kilns were replaced by an 11½- by 400-ft. kiln of slightly greater capacity, and a 1,250-hp. finish mill was installed; both are F. L. Smidth. Other equipment included a grate and a Buell electrostatic precipitator.

A $2,000,000 Koppers electrostatic precipitator installation at Lehigh's Fogelsville, Pa., plant will be completed early in the year.

Good progress was reported at Lehigh's Mitchell, Ind., plant, which will practically be a completely new operation with a capacity of 2,500,000 bbl., an increase of 700,000 bbl. Two new 11½- by 400-ft. F. L. Smidth kilns went into operation late in 1959. The second stage, costing $12,000,000, will be completed early in the year. This phase consists basically of new cement storage silos, a storage building, and a mill department with five 1,250-hp. Smidth mills—two raw and three finish.

Lehigh's plant at Ormrod, Pa., was shut down early in the year. It had not been operated since 1958.

**Lone Star** The Lone Star Cement Corp. in 1960 completed the construction of bulk truck-loading silos with a total capacity of 90,000 bbl. at its Nazareth, Pa., plant, designed and built by the Macdonald Engineering Co.

Expansion of the Norfolk, Va., plant, to be completed in 1961, will increase capacity, by 1,000,000 bbl., to 2,300,000 bbl., at a cost of $6,500,000. Equipment will include a new 10½- by 340-ft. Allis-Chalmers dry-process kiln and three Nordberg mills—two 9½- by 35-ft. 2-compartment raw mills and an 11- by 26-ft. 2-compartment finish mill.

**Louisville** The Louisville Cement Co. completed a new $1,000,000 finish-grinding department at its Speed, Ind., plant. Included is a 10- by 34-ft. Allis-Chalmers two-compartment mill.

In October Louisville announced plans for a new 1,000,000-bbl., $10,000,000 wet-process plant, to be built near Logansport, Ind. This is to have a 12- by 425-ft. kiln. Construction is to get under way early in 1961, and operation is to start about January, 1963.

**Marquette** As a part of its continuing expansion and improvement program, the Marquette Cement Mfg. Co. in 1960 completely rebuilt the raw- and finish-grinding departments at its Rockmart, Ga., plant. Nearly $5,000,000 was spent on the Nashville, Tenn., plant, where raw and finished material silos and slurry tanks were built by the Macdonald Engineering Co. Bulk car- and truck-loading silos with a total capacity of 105,000 bbl. are now being built.

Extensive work is now going on at Marquette's Superior, Ohio, plant for mid-1961 completion. The plant is being moved to a better site closer to the quarry. A covered craneway storage, a raw-grinding department with 9½- by 15-ft. grinding mills, raw-mix and blending and clinker silos, a 13½- by 12- by 425-ft. Allis-Chalmers kiln, and a finish-grinding department with an 11- by 32-ft. Allis-Chalmers mill, and cement silos are being built. No great change in the present 1,250,000-bbl. annual capacity is expected when this work is completed in 1961.

Dust-collector installations at the Des Moines, Iowa, Milwaukee, Wis., and Nashville, Tenn., plants are to be made, at a total cost of $2,500,000.

During the year Marquette purchased or made other arrangements for property for possible future plant sites at Glen Haven, Wis., Austin, Tex., and Albany, Ga. Property was also acquired at Chicago and St. Paul, Minn., for distributing plants. The Chicago terminal would be used to distribute cement from the Oglesby, Ill., plant, but it is also a possible site for a cement plant. Preliminary designs have been completed for a 2,250,000-bbl. plant.

Marquette plans to spend about $29,000,000 over the next four years to modernize and expand the plants of the recently acquired North American Cement Co. and Green Bag Cement Co. Large-scale modernization work will be concentrated at the Catskill, N. Y., plant of North American and at the Pittsburgh plant of Green Bag, with certain essential improvements at the Howe's Cave, N. Y., and Security, Md., plants to bring about lower production costs. The capacity at Catskill will be increased 50 percent.

A new source of raw materials has been developed for the Pittsburgh plant. Also contemplated are permanent shipping plants on deep water ports along the New England coast, to be supplied from the Catskill plant on the Hudson.

Total expenditures on capital items in 1960, principally for major plant modernization, were more than $9,000,000, with a carryover into 1961 of more than $6,500,000 of approved work. This does not include the North American or Green Bag projects. Capital expenditures for all plant modernization and rebuilding in 1961 should approach $12,000,000.

**Medusa** The Medusa Portland Cement Co. in 1960 made substantial progress on its ten-year $70,000,000 expansion and modernization program, which will increase its productive capacity one-third, to $16,000,000 bbl. annually. The first step in this program, completed late in the year at a cost of $9,000,000, was a 1,000,000-bbl. addition to the Dixon, Ill., plant which increased its capacity about 40 percent. New equipment included an 11- by 400-ft. dry process kiln and two 13- by 16-ft. ball mills—all Allis-Chalmers.

Modernization is planned at the York, Pa., Toledo, Ohio, and Manitowoc, Wis., plants.

Medusa's Bay Bridge, Ohio, plant was shut down during the year; and it will be used only as a storage and distributing station.

**Missouri** The Missouri Portland Cement Co. in 1960 installed dual truck bulk-loading silos at its Sugar Creek, Mo., plant. A similar installation is planned for the Prospect Hill (St. Louis) plant.

**Monarch** The Monarch Cement Co. is reported to have completed a $750,000 expansion of cement storage facilities at its Humboldt, Kans., plant. The bulk car- and truck-loading silos added have a capacity of 135,000 bbl.

**Northwestern States** The Northwestern States Portland Cement Co. has just completed a new 3,500-bbl. per day addition to its plant at Mason City, Iowa. This is essentially a complete new plant, with a 500-t.p.h. crushing and screening department, a 12- by 11½- by 400-ft. Allis-Chalmers kiln, an 11-ft. by 16-ft. 10-in. Smidth raw mill, a 9½- by 36-ft. Smidth finish mill, a Wheelabrator glass bag kiln gas dust collector and bulk truck-loading silos. These facilities were designed and built by the Macdonald Engineering Co.

**Oklahoma** In July, 1960, the first cement was shipped from the new 1,000,000-bbl., $8,000,000 dry process plant of the Oklahoma Cement Co. at Pryor, Okla. This company had purchased the assets of the Ozark Portland Cement Co. Major equipment includes an 11- by 375-ft. kiln and two 11- by 20-ft. raw and clinker-mills—all Kennedy-Van Saun. The George A. Fuller Co. was general contractor and engineer on the job and A. J. Anderson was consulting engineer. The three raw material blending silos and 130,000-bbl. cement storage silos were designed and built by the Macdonald Engineering Co.

**Oregon** The Oregon Portland Cement Co. in 1960 spent about $450,000 at its Oswego, Oreg., plant in the construction of storage silos for 50,000 bbl. of cement, a new grinding mill for use either to grind pozzolan or finished cement, and some improvements for river loading.

**Penn-Dixie** The Penn-Dixie Cement Corp. has near completion an expansion program at its Clinchfield, Ga., plant which will increase its capacity by 1,100,000 bbl. to 2,300,000 bbl. annually. New equipment installed included an 11½- by 450-ft. Traylor wet-process kiln, new raw- and finish-grinding departments, with Nordberg mills (a 9½- by 34-ft. 3-compartment raw mill, and a 10- by 33-ft. 2-compartment finish mill), and additional cement storage silos.

At the Kingsport, Tenn., plant two 12- by 25-ft. Nordberg 2-compartment mills were installed in a new grinding department. A 9½- by 32-ft. Kennedy-Van Saun clinker mill was installed at the Richard City, Tenn., plant.

**Permanente** The Permanente Cement Co. in August put in operation its new 1,700,000-bbl., $13,500,000 cement plant on the island of Oahu, Hawaii. Major equipment inclcudes a 13- by 14½- by 450-ft. F. L. Smidth kiln and Smidth mills. Kaiser Engineers did the engineering, design, and construction. A cement distributing plant was built on Guam in the south Pacific, and the Honolulu distributing plant was enlarged.

A $1,000,000 expansion program is under way at Permanente's Olympic Portland Cement plant at Bellingham, Wash. New crushing and grinding facilities are included. A $125,000 distributing plant is planned for Eureka, Calif., which will receive cement by rail.

Late in 1960 it was announced that Permanente will start construction as soon as possible on a new 500,000-bbl., $5,000,000 cement plant near Anchorage, Alaska. The plant and site are expected to cost about $5,000,000.

**Phoenix-American** The new Clarkdale, Ariz., plant of the Phoenix Cement Co. Division of the American Cement Corp., which was completed late in 1959, is now being expanded with a second (12- by 10- by 350-ft.) dry-process Traylor kiln and related equipment. This addition, to be completed in mid-1961, will expand capacity by 800,000 bbl. to 2,600,000 bbl. annually. This plant is supplying 3,100,000 bbl. of cement for the Glen Canyon Dam in Arizona.

**Puerto Rico** The Puerto Rico Cement Co., San Juan, Puerto Rico, is reported to have expanded its plant by the installation of a 14- by 12½- by 465-ft. wet-process kiln and two 11- by 34-ft. Compeb mills —all Allis-Chalmers.

**Riverside-American** The Riverside Cement Co. division of American Cement Corp., is reported to have well under way the construction of a new 250,000-bbl., $5,000,000 white cement plant at its existing Crestmore, Calif., portland cement plant. Major equipment includes a 9- by 253-ft. kiln and two raw- and finish-grinding mills—all F. L. Smidth. Production is expected to begin in February, 1961. The old grey cement facilities at this location are being completely overhauled and partly replaced.

**Texas Industries** Production began in September at the new 1,400,000-bbl., $14,000,000 wet-process plant of Texas Industries, Inc., at Midlothian, Tex. Major equipment includes a 12- by 450-ft. wet process kiln, a 10- by 38½-ft. raw mill, and an 11- by 34-ft. finish mill—all Traylor. Raw material, clinker, and cement silos were designed and built by the Macdonald Engineering Co. It is reported that about 60 percent of the output will be captive production.

**Universal Atlas** The Universal Atlas Cement Co. recently completed the installation of a $775,000 glass bag dust-collecting system at its Fairborn, Ohio, plant. A similar system was installed in 1959 at the Northampton, Pa., plant at a cost of $300,000, and additional collectors are now being added there at a cost of $1,000,000.

An expansion program underway at the Waco, Tex., plant will increase the capacity to more than 2,000,000 bbl. annually. A second kiln and related equipment will be in operation late in 1961.

It was recently announced that Universal-Atlas had acquired sites for cement distributing plants at Norfolk, Va., and Jacksonville and Port Canaveral, Fla. A similar plant is proposed for Port Everglades, Fla. Through a foreign subsidiary an option has been obtained for property and cement manufacturing rights at Freeport, Grand Bahama Island, and a plant is being designed.

**Utah** The Portland Cement Co. of Utah late in the year completed a $1,500,000 expansion program which doubled its capacity to 1,000,000 bbl. annually. Equipment includes a 10- by 300-ft. Allis-Chalmers wet-process kiln, finish mill, mechanical, and glass bag dust-collectors, etc.

REVIEW and FORECAST

# Aggregate Industries:

## ■ Reach peaks, hold to high levels

By BUREN C. HEROD

PARALLELING construction, the primary segments of the aggregates industries established new production peaks in 1959, and then apparently leveled off during 1960. According to information gathered from producers in the annual PIT AND QUARRY survey through the final weeks of 1960, plus comments obtained from top representatives of the various national industry associations, the aggregates industries have, as anticipated in these pages in the last two annual reviews, settled down to a more gradual, consistent rate of growth.

The two major tonnage groups—sand and gravel, and crushed stone—set new production and sales records during 1959. Also, as anticipated here last year, the rate of increase was slightly lower for both groups than had been recorded in preceding years. During the last year, according to the producers' estimates, the demand leveled off to about the same rate as experienced during 1959. When the final figures have been compiled for 1960, they will probably show production to be within 1 or 2 percent. In fact, the early estimates now at hand indicate that sand and gravel producers feel they will have produced virtually the same tonnage in 1960 as in 1959; crushed stone operators look for a possible small increase of 1 to 2 percent.

Despite the prolonged steel strike of 1959, the slag industry maintained a pace equal to that of the preceding year. This was made possible by increasing utilization of stocks to meet demand. The slag operators are in the position of enjoying wide acceptance of their product; and at the same time they are facing the problem of reduced availability of raw material due to curtailed blast furnace operation.

The survey data in this section has been broken down to the major geographic regions shown on this map.

One of the crushed stone industry's outstanding plants, this 1,500-t.p.h. facility was built for the Consumers Company Division, Vulcan Materials Company, to replace an obsolete operation on Chicago's south side. The primary crusher, left, secondary crusher and surge installation, right, are on the quarry floor level. The screening and finer reduction circuits are on the upper level, background.

This situation has spurred the industry to intensify its efforts directed toward most effective utilization of open-hearth slag, and new markets for that material.

1960 will probably equal 1959 in tonnage sold; and since demand is still higher than furnace output, customers will have been supplied by further depletion of stocks. Should blast furnaces resume the rate anticipated in 1961, it will mean that the slag industry will gain further ground in the aggregate market, and return to a level above 30,000,000 tons.

All lightweight aggregates but one made impressive gains during 1959, according to the latest statistics available. The exception was expanded slag, which was hampered by material availability, as noted above. The slackened pace of construction during 1960 will have its effect on these materials, but they will probably end up the year close to the high level of 1959. The anticipated increase in the major construction categories for 1961 will mean that the lightweight materials will reach new production records this year.

In conformance with past procedure, the PIT AND QUARRY survey again involved mailing questionnaires to several thousand operators throughout the country, and it was set up to obtain the most representative cross section possible. We ask for information covering a three-year period, since experience has shown that projections based on such multiyear data have had a higher degree of accuracy.

This survey information, coupled with the latest U. S. Bureau of Mines statistics and comments furnished by industry association officers, form the basis for the analyses presented here.

From the data so gathered in our 1959 survey, it was estimated here last year that production of sand and gravel during 1959 would be about 5 percent higher than in the preceding year, and that it would set a new record. Our estimate was comfortably close. At 730,000,000 tons (another record), according to the Bureau of Mines final figures—the industry's output was less than 1 percent above our predicted figure of 725,000,000. This and following figures in discussion of sand and gravel include government-contractor operation tonnage. In 1959 the latter amounted to 27 percent of the total.

During the last year the sand and gravel operators apparently held close to the record level of 1959, according to the survey returns. A year ago they felt that 1960 would show a small gain. In the light of their comments in the latest survey, their expectations were close to performance. Accordingly, production in 1960 will probably fall between 730,000,000 and 735,000,000 tons.

When 1961 draws to a close, the industry will have set another record, according to our survey returns; but although some producers express anticipation of a sharp rise, a large number are more moderate, and in the over-all picture the gain expected will parallel construction activity and will approximate 5 percent.

The crushed stone industry performed somewhat better than its members thought it would during 1959. However, their observations and the estimate made here a year ago on final 1959 performance was that a new record would be reached through a gain of 5 percent. The final Bureau of Mines figure of 470,000,000 tons represents an 8 percent rise. (The foregoing figure and those following relating to crushed stone do not include stone used in the production of cement or lime.)

A record tonnage in 1960 is also indicated by the quarrymen, although the indicated gain is relatively slight. Based on our returns, the crushed stone industry produced about 475,000,000 tons last year.

Estimates of expected markets for crushed stone during 1961 show optimism, but do not reflect the possibility of a rapid surge. The producers are somewhat more moderate in their predictions than they were a year ago; but if their hopes bear fruit, a new record of 480,000,000

tons will be produced during 1961.

The information presented in the following discussion, assembled to such categories as capacity, wages, prices, etc., has been tabulated by geographic sectors which are comparable to the major market areas delineated by the U. S. Department of Commerce.

Since our policy dictates that each of the returns received in our survey shall be confidentially treated, we do not divulge any individual company figures in our annual review and forecast. The returns are grouped so that only those regional and national averages which reflect the trends of the most significant factors will be developed.

## SAND AND GRAVEL

Based on the returns from our survey last year, it was estimated that production of sand and gravel in 1959 would probably reach 725,000,000 tons. At 730,000,000 tons, per Bureau of Mines figures, the gain was within 1 percent of expectations.

In 1960 the construction rate dropped off, and figures given in our most recent survey indicate a comparable slackening in sand and gravel output. It seems that production rose, if at all, only slightly to about 735,000,000 tons. The latter is the same as the figure predicted a year ago, and it gains further support by the operators' actual experience.

In 1961 the gain in construction anticipated by economists will probably be reflected by a parallel rise in sand and gravel production, and it may be expected to pass 740,000,000 tons. Support of this estimate is found in the fact that eight times as many producers indicated an expected gain in 1961 as those showing some pessimism. In addition, the latter looked for only a small decrease; the others anticipate substantial increases.

**Hourly Capacity** By its nationwide scope, our survey shows that on a weighted average of regional data, hourly capacity rose about 7 percent during the last year. As suggested a year ago, this average has declined somewhat from the increases reported in preceding years, due to the fact that the majority of the operators who were expanding to meet increased demands of highway and other construction have completed their programs, and are now geared to projected needs. Our figures show that producers in the Northeast recorded the largest rise in hourly plant capacity.

**Selling Prices** Producers' figures show a slight rise in unit prices of both sand and gravel—but as in preceding years unit sales value did not rise to the same extent as labor and other operating costs. With such conditions, plus profit margin considerations, it becomes obvious why the individual industry member becomes so cost-conscious with respect to his equipment and operating phases.

On a national average, the selling prices of sand and gravel rose by 1 and 3 percent, respectively. Regionally, one section of the country showed a slight dip. In the West only sand prices were reported to be down less than 1 percent from the previous year.

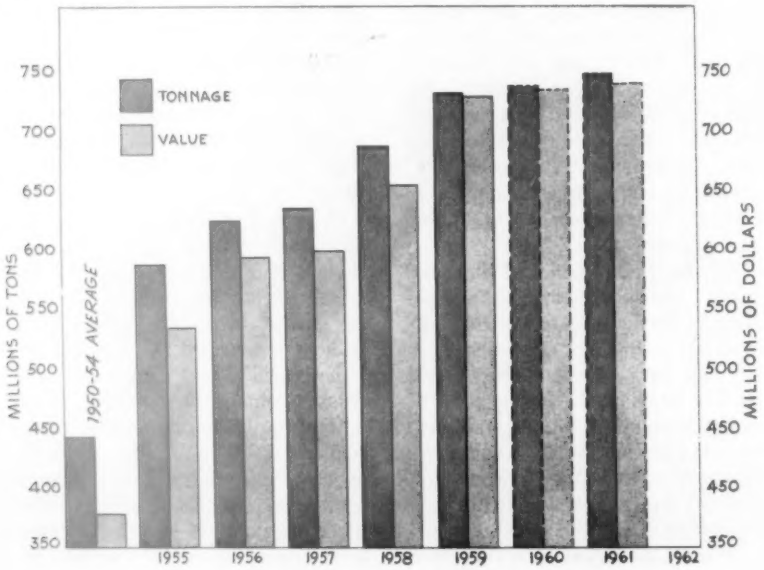
**Wages** The increase in labor cost was twice that of gravel sales price the producers returns show. For the entire industry, the average of reported increases was 6 percent. Operating efficiency based on maximum tons per man-hour with minimum down-time has become axiomatic in successfully offsetting this steadily rising cost element.

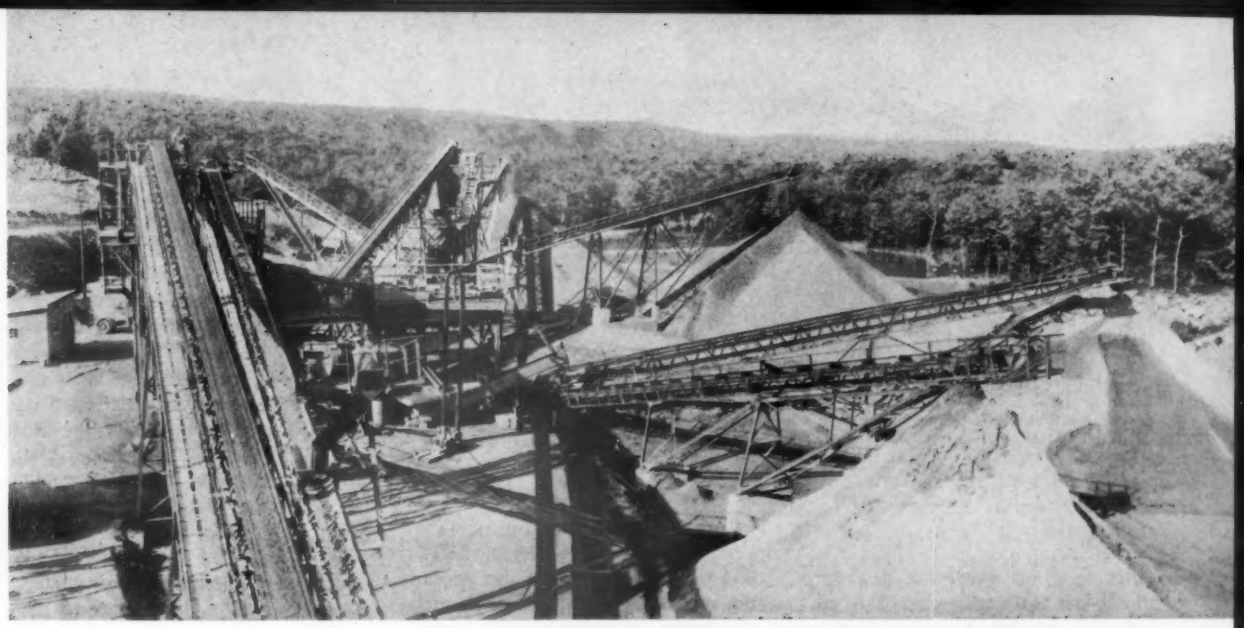
As expected from past reports, the West continues to lead with the highest hourly wage rate—a rate which rose again by 4 percent. Significantly, the South seems to be experiencing more change in the labor picture, and this area reported the largest increase in rate this year.

**General Operation Factors** To obtain a broad perspective and background against which the above information can be more realistically appraised, our annual survey again contained questions concerning production periods, employees, operating methods and equipment, and possible trends. As with the points discussed above, this information was used to develop both regional and national averages for the various factors.

Although frequently regarded as seasonal in its operating aspects, the industry does not conform to that generalization. True, the national average is 11 months of oper-

Production and value of sand and gravel since 1955 compared with the 1950-54 average. Quantities include government-contractor operations which in 1959 accounted for 27 percent of the total. Columns for 1960 and 1961 are based on replies to our survey.





Located in the Catskills of New York, this 200-t.p.h. sand and gravel plant of Sullivan Highway Products Company is a major producer in its area. It was built to process the reserves in a new deposit site in lieu of moving older equipment to this location.

ation in 12, but the time taken for general repair and equipment replacement may fall anywhere from October to March.

A growing percentage of operations are apparently being supplied from wet-pit or dredging sites. This increase is small in each year, but rather consistent. It seems to reflect more extensive utilization of existing areas which would frequently involve going below the water table. Also, zoning problems hang over the industry like a Damoclean sword, a fact which leads operators to get the most possible out of present pits.

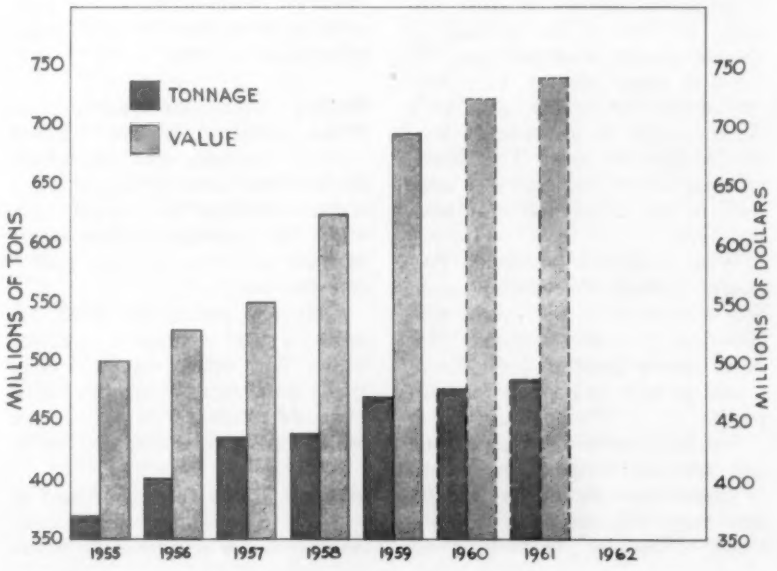
The effect of material specifications on processing phases, reported here in recent surveys, continues to be an important factor. To meet percentages of crushed products, the majority of producers have reduction units in their plants, and are crushing from one-third to two-thirds of the gravel fraction.

**Outlook** Production during 1961 is estimated at 740,000,000 plus tons— an estimate based on the expectations submitted by our answering producers. These estimates were compared with the projections of total new construction during the coming year, as determined jointly by the Department of Commerce and the Department of Labor.

The latter indicates a gain of 4 percent over 1960, and the producers parallel that prediction in their comments. Further, a significant number of our returns report plans for expansion and modernization—steps which would not be taken if there were uncertainty in the future.

They won't be small steps, according to the operators' statements. On a national average, the expenditure involved for each company that has improvement projects on the drawing board, or under way, is more than $40,000.

Part of this expansion is slanted at meeting expected demands of the highway program construction in various areas. A somewhat larger percentage of our returns than last year report the effect of this construction. However, an identical




Crushed stone production and value since 1955. Estimated amounts shown for 1960 and 1961 are based on returns in our survey. All figures exclude stone used in cement and lime.

A new member of the aggregate industry in the upper North Central region is the North Central Lightweight Aggregate Company, Inc., who built this new Aglite plant near Minneapolis.

percentage of answering producers in the last two surveys (57 percent) indicate that the highway program will have no effect on their business.

## CRUSHED STONE

Another bulls-eye was made by the crushed stone producers in their survey questionnaires a year ago. At that time the figures they submitted indicated that production in 1959 would be about 7 percent above 1958. According to the present final statistics of the Bureau of Mines for 1959, the total output was 470,000,000 tons—1 percent above the projection based on producers' figures — and another record.

Although smaller, a further increase in 1960 was predicted last year, and the data submitted in the latest survey follows the same pattern. In view of the similarity of the two groups of observations, the crushed stone industry may have set another record last year, by a small margin, in producing a total of 475,000,000 tons. This figure, as noted earlier, is exclusive of stone used in the production of cement and lime.

What is 1961's potential? Producers looking for another record year outnumber 6 to 1 those who anticipate a smaller demand. Another sizable group is confident of a year at least as good as that just past.

The indicated percentages of gain and decrease, weighted by groups of returns from the various regions, were approximately the same—about 15 percent. In view of the fact that 80 percent of the answering producers hold an optimistic viewpoint, it seems within reason to expect that crushed stone production and sales this year will reach a new peak of more than 480,000,000 tons.

**Hourly Capacity** In line with the steadily increasing demands of recent years, the crushed stone operators continued to expand their hourly productive capacity. All regions had a higher average than the preceding year, including the West, which holds the lead. The South registered the largest increase. Nationally, the average increase for the industry was 14 percent.

The higher capacity gains reported by the southern operators is paralleled by their expansion plans and connection with highway construction, both of which are indicated to be higher than in the other geographic sections.

**Selling Price** Prices for crushed stone aggregates have remained virtually static throughout the last three years. In fact, a rather stable condition has existed since 1956. On a national average, prices of these materials rose less than 1 cent last year.

Only one region, the West, reported a slight increase in unit sales value. The others reported practically no change. While this factor remained constant, this was not true of other major costs discussed below.

**Wages** Labor costs continued to climb at a steady rate. Average wages were up about 6 percent during 1960, according to the producers—a rate equal to the gain registered during the preceding year. At the same time, as pointed out above, unit product income remained practically unchanged.

The increase in this cost center experienced by the quarrymen was identical to the percent of increase reported by their sand and gravel industry colleagues. The West consistently reports the highest wage rates, but also has one of the most favorable tons-per-man-hour ratios. Producers in the Northeast again reported the highest percentage of increase in labor cost.

**General Data** The majority of the operators replying to this survey report that their deposits and processing furnish products with which they have no difficulty in meeting specifications. Among those who have some problems, they report that their raw material is basically sound and would only require somewhat more cleaning to furnish products conforming to most requirements. In comparison between the crushed stone operators and the sand and gravel producers, the former seem to have an edge, but a very slight one in this situation.

Compilation of replies to another of our survey questions shows that one-third of the crushed stone operations have related activities. These primarily involve bituminizing facilities and ready mixed concrete installations. A small number of firms have diversified to the point of also producing concrete masonry.

**Outlook** An even 80 percent of the answering producers —a percentage identical to that of the preceding survey — indicated that business in 1961 would be at least as good as (or better than) experienced during the past 12 months. Nearly one-half of the group predicted gains that averaged out nationally to about 15 percent. Almost the same percentage of replies in the latest survey and in 1959 contained expectations of a decline. In both years, less than 10 percent of the returns were pessimistic.

Both those who look for further gains and those who expect to remain at the present high level are backing their hopes with substantial

expenditures. More than a third indicate plans for expansion through the addition of quarry and/or processing equipment, or the construction of new plants.

On a national average, the funds earmarked for these programs amounts to about $48,000 per company. This sum is about one-third less than indicated a year ago, but many have completed earlier expansions to meet demands in their areas. Almost the same percentage of crushed stone producers as sand and gravel operators expect to be affected little, if any, by the progress of the highway program. The percentage was also nearly the same as that reporting the same way a year ago.

In view of the similarity of information presented in the last two surveys, it seems that the market pattern will remain unchanged, but that tonnage supplied to meet existing types of demand will increase in line with the over-all economic picture.

## SLAG

Consistently high demand has been enjoyed by the slag processors, and they are faced with a situation in which demands exceed the supply of slag from current blast-furnace production. The latest complete annual figures compiled from a canvass conducted co-operatively by the National Slag Association and the Bureau of Mines show that the slag industry processed 28,370,000 tons of iron blast-furnace slag during 1959. This was virtually the same rate as in 1958, and was accomplished despite the prolonged strike in the steel industry.

However, the effort required further depletion of already diminishing reserve slag banks. Expanded-slag production was kept at a high level by diverting more molten slag to this use before the strike went into effect. This caused some reduction in the amount of granulated and air-cooled slag that would otherwise have been processed. In total, slag production in 1959 was better than predicted here last year, by more than 3,000,000 tons—due to more extensive utilization of reserves than anticipated.

In view of the industry's intensive and far-sighted efforts in research on new applications for open-hearth slag, it will probably hold strongly to the 1959 level of blast-furnace slag processing during 1960, although still bucking the problem of blast furnace production rates.

The picture for 1961 shows a possible reduction in the present problem since it is expected that the steel industry will be operating at a higher rate than recorded for the last couple of years.

The complete statistics for 1959 show that 77 percent of the total output was represented by screened air-cooled slag. The tonnage was nearly 22,000,000, a 6 percent increase.

## LIGHTWEIGHT AGGREGATE

Production and utilization of lightweight aggregate materials registered an impressive 10 percent increase in 1959 (the latest year of complete data) over 1958. Gains or steady high rate were shown by all major commodities, including expanded slag, expanded clays and shales, vermiculite, perlite, pumice, and volcanic cinders. The largest jump was made in sales of expanded clays and shales—18 percent—but the other materials were not far off that pace. The one exception was expanded slag, where raw material availability was a problem, as noted previously; however, this product was processed at a high rate.

Viewed in the light of the general construction picture during 1960, total lightweight aggregate production was probably quite close to the 1959 figure. The expectation of an improvement in major construction categories during 1960 would indicate a comparable gain in markets for these materials.

**Expanded Slag** Slightly over 2,800,000 tons of expanded slag were produced in 1959, quite close to the quantity processed in 1958. Over 97 percent of the 1959 tonnage was used as aggregate in concrete masonry manufacture. About 1½ percent was used in the manufacture of lightweight concrete.

**Expanded Clays, Shales** Production of lightweight aggregates accounted for 11 percent of the total clay produced during 1959, according to Bureau of Mines data. The tonnage of lightweight materials was 5,270,300—an 18 percent increase over 1958. In the latter year, lightweight aggregates used about 10 percent of the total clay produced.

**Vermiculite** An increase of 8 percent was registered in the production of crude vermiculite during 1959. Exfoliated material amounted to 153,000 tons, and was valued at $9,591,000, or an average value of about $62.70.

Lightweight concrete aggregate, building plaster, and loose-fill insulation represented the major markets. The development of new products noted here last year—a water repellent masonry fill and a one-coat application fireproofing surfacing—have apparently met with considerable success.

**Perlite** At the end of 1959 the quantity of mined crude perlite stood at 443,000 tons. This volume, a 19 percent gain over 1958, more than regained the ground lost in the preceding year—the first drop recorded by the industry in the last ten years. The total crude sold and used was also at a new high of 325,000 tons.

Production and sales of expanded perlite also rose to new high levels of 276,000 and 273,000 tons, respectively.

**Pumice** The domestic pumice industry reached the highest levels of production and sales in the past decade during 1959. Combined tonnage of pumice and pumiceous materials was 2,200,000, and this quantity was valued at $5,500,000. Percentages of increase in production and value were 11 and 14, respectively, over 1958, according to the Bureau's preliminary figures.

The greatest amount of production is used as concrete admixture and concrete aggregate, and the growth of the industry closely parallels the diversification of concrete construction in this country during recent years.

REVIEW and FORECAST

# Other Nonmetals:

## ■ Most Holding Steady on Sound Growth

By BUREN C. HEROD

IT WAS noted in this section of the review and forecast prepared a year ago that neither boom nor bust were applicable terms for future prospects of most nonmetallic minerals. The opinion was advanced that relatively normal economic patterns, paralleling stable growth of gross national product, would predominate; and that production and sales experience, particularly of the major nonmetallics, would conform to those patterns.

On the records of most nonmetals for the last 12 to 18 months, this opinion has been proved to have a solid basis. Following the reversal of the downward trend of two years ago, most of these industries returned to a steady growth curve comparable to the average annual growth pattern of the GNP.

Statistics for varying periods of 1960 on certain of the commodities discussed below, and final 1959 figures for all nonmetals considered here, have been compiled by the Bureau of Mines. These, plus information furnished by production and industry association leaders, indicate that new or near records in production and/or sales were realized by most of the major materials discussed in this section. All but one registered gains over the preceding reporting period, and that one—gypsum—dropped only slightly from a record high.

► Future prospects seem to be continuingly favorable. According to the professional economists, the country's over-all economy currently shows "symptoms of softness." As far as the nonmetals industries analyzed here are concerned, this "softness"—during recent months—amounts primarily to a leveling, or a temporary production plateau. There are no signs, or expectations, of any significant dips.

► Further gains may be anticipated in view of the predicted fourth-quarter upturn in the GNP for 1960, a leveling for the first few months of 1961, and then a solid over-all climb in the economy, starting by mid-1961.

Along with the latest tonnage statistics compiled by the Bureau of Mines, pertinent background information available on some of the nonmetals is included in this report. Not only the major materials discussed here but also the lower tonnage commodities have displayed exceptional growth.

According to the latest available figures, lime sales and use through the first nine months of 1960 were nearly one-third above the pace in 1959. This indicates that lime will probably come within close range of the 12,508,000-ton record set in the latter year.

The record figures for 1959 are actually due in considerable part to increased coverage of captive lime operations by the Bureau of Mines. Nevertheless, the industry's performance was the most outstanding in its history, representing an impressive 18 percent jump over the previous record year, 1956.

During 1959, the use of agricultural limestone on the nation's soils dropped about 2 percent in quantity from consumption in the previous year. It had been estimated here last January that the figure would be approximately the same as in 1958.

As pointed out by an agricultural limestone industry spokesman, the national consumption of this material parallels Agricultural Conservation Program appropriations—and the latter has remained at the same level for the last six years.

It is hoped that appropriations will be increased for ACP liming programs subsequent to fiscal 1961, but until that time the agstone tonnage consumed will apparently remain near its present level.

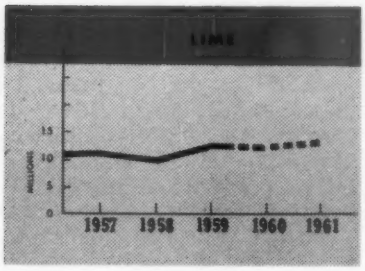
Crude gypsum production during the first two quarters of 1960 was about 8 percent lower than in the comparable period of 1959. The lat-

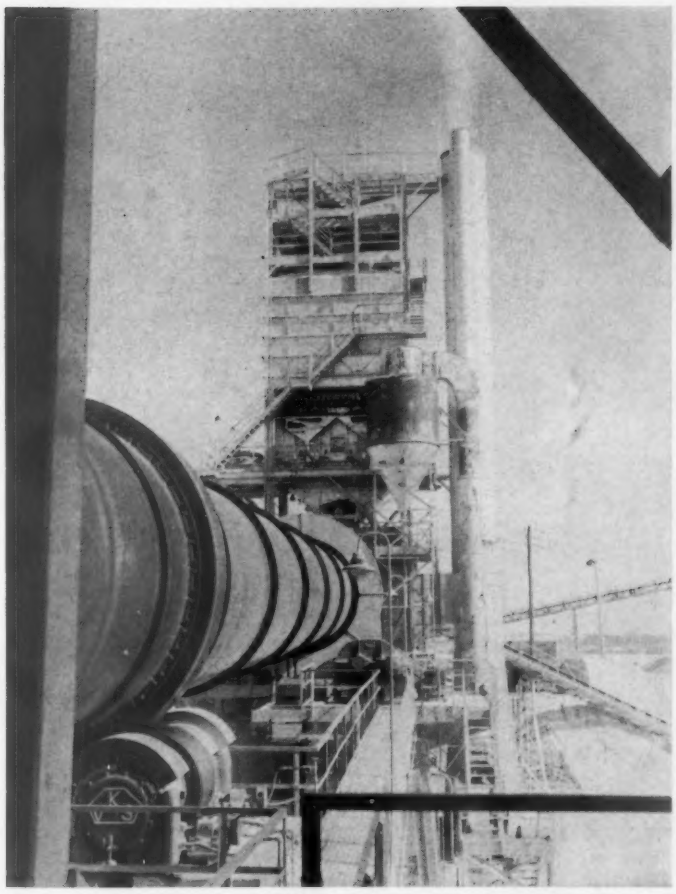
ter year, however, saw the industry set a new record, and despite the drop—due to fewer housing starts than predicted—total production in 1960 should still show a healthy level of nearly 10,000,000 tons.

Fluorspar, like lime, suffered from the effects of the steel strike in 1959, and the improvement in that market accounts primarily for the gains shown during the first half of 1960 over the same period of 1959.

Phosphate, potash, mica, and talc are commodities which set new records during the last complete reporting period. Feldspar, clays, boron, graphite, and kyanite all registered impressive gains, and in some instances, came very close to previous records.

Charts heading each of the following commodity discussions are based on the latest available Bureau of Mines statistics.



This 225-t.p.d. rotary lime kiln is one of the recent installations of this type in the southwest. Operated by the Austin White Lime Co., McNeil, Tex., it solved the problem of utilization of small stone unsuitable for companion shaft kilns, and furnishes a premium product for particular markets.

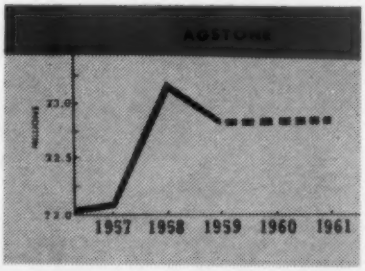
An encouragingly high level of lime sales was maintained through last September. Over 9,000,000 tons, of which about 66 percent was open-market lime, were sold. This represents an impressive jump over the same reporting period of 1959, although, as noted previously, captive operations were more completely canvassed than before.

Quicklime represents 77 percent of total open-market sales in the period noted, and hydrate the balance. Both types increased about the same percentage over their respective tonnages in 1959.

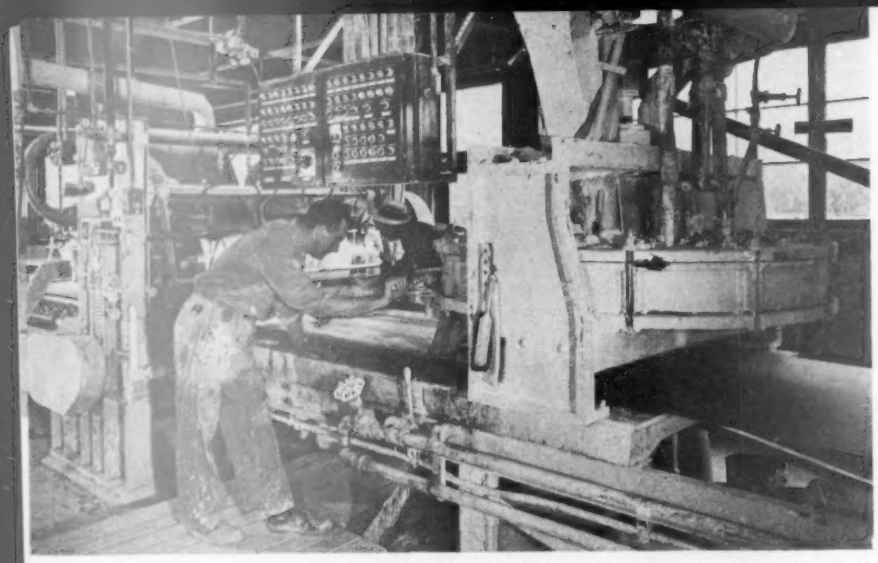
► The largest jump among the four categories of use was in chemical and other industrial—over 50 percent. This is largely due to greater coverage of captive production (of alkali producers), but also to steel. Refractory sales also rose by 2 percent in comparison with the first nine months of the preceding year. However, sales to agricultural and construction use dropped by 10 to 18 percent, respectively.

Total 1959 production, as computed by the Bureau of Mines under the new procedures, amounted to 12,508,000 tons. As estimated by the industry association's staff, about 8,300,000 tons of that total was open-market lime. Projection of industry performance through the final months of 1960 indicates that total sales and use for the year should approximate 12,000,000 tons.

► What are prospects for 1961? In the opinion of an industry spokesman, it should be a good year, "with open-market tonnage topping 8,000,000 tons." Two growth factors that show up in any study of future prospects for the lime industry are reported to be the trend to basic oxygen converters in the steel industry, "which increases the quicklime/steel ratio from about 25 lb./ton to about 140 lb./ton." This is described as a factor which will be felt more significantly in 2 to 5 years. Lime for stabilization is regarded as another important market. The steady growth of recent years is expected to continue.




The fairly constant rate of consumption of agstone by the nation's farmers is, as noted earlier, rather directly related to the amount of ap-



One of the newest production facilities in the industry is Bestwall Gypsum's board and lath plant at Brunswick, Ga. Shown here are the slurry mixer and controls at the forming end of the board machine.

propriations for Agricultural Conservation Program practices. This appropriation has been $250,000,000 for the last six fiscal periods.

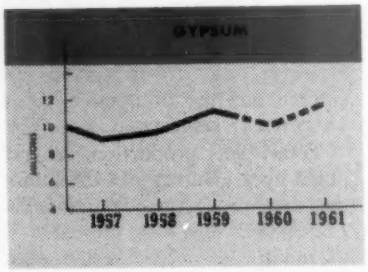
On this basis, and in view of comments from industry leaders, it was assumed in the last annual review that agstone use in 1959 would be close to that in 1958. The actual consumption of 22,726,000 tons was just 2 percent below the preceding year. Since the appropriations for ACP are the same through fiscal 1961, the usage through 1960 and the coming year will very probably remain near that level.

Despite estimates of scientists and agricultural specialists that the country's soils need an application of more than 80,000,000 tons—just to return them to the proper nutrient level—the nation's farmers continue to fall far short of that goal. In the last annual figures available, for 1959, only 28 percent of the needed tonnage was applied.

Pooled efforts on the part of agricultural agencies, the industry association, and fertilizer companies have been steadily intensified toward farmer education, but the farmer still only applies liming materials at a rate directly related to ACP funds.

Last year it was found that 25 of 40 states reporting agstone use had registered increases over the preceding year. During 1959 the number of states reporting increased use rose to 29. However, the latter failed to offset completely the decreased usage reported by five of the top ten states.

The leading state, Illinois, dropped 23 percent to a total of 2,890,000 tons, Missouri ranked second, and its use rose 13 percent to 2,468,000 tons. In order of rank, the others among the top ten are Indiana, Ohio, Wisconsin, Tennessee, Kentucky, Iowa, New York, and Pennsylvania.




Production of domestic crude gypsum during the first six months of 1960 dropped about 8 percent in comparison with the first half of 1959, according to Bureau of Mines reports. The total for January-June, 1960, was 4,771,000 tons.

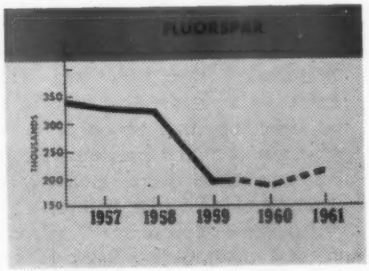
Imports also dropped by 13 percent; and the apparent supply, based on decreases in both domestic production and imports, was 10 percent less, 7,000,000 tons.

We were correct, although somewhat conservative, last year in our opinion that the industry would exceed 10,000,000 tons in output of crude. It reached a new high, producing 10,900,000 tons. Calcined gypsum production also was up, by 13 percent, to a new record of 9,268,000 tons.

Despite the experience of the first six months of 1960, it is expected that sales will recover to the extent that production of crude for the full year will approximate 10,000,000 tons. It was noted a year ago that estimates of new housing starts in 1960 were lower than the year before. Those estimates were correct and there was an obvious effect on gypsum product sales.

The above is evidenced in the record of lath and wallboard use, two of the three largest of all gypsum product use categories. In these instances, lath was down by 14 percent, and wall board by 4 percent, in comparison with the same period of 1959. Portland cement retarder, second only to wallboard among all uses for gypsum, was down 8 percent in direct relationship to the 8 percent (approximate) drop in portland cement shipments.

► An improvement in 1961, possibly a return to nearly the record pace of 1959, may be expected. This would be a natural parallel to the predicted activity in construction. Estimates are that the latter will show some improvement this year over 1960, and the latter was only 2 percent down from 1959.

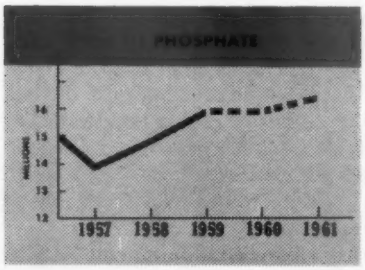



Total production and shipments of finished fluorspar during the first six months of 1960 were reported by the Bureau of Mines at slightly more than 100,000 tons. This figure is somewhat more than half of the entire production of the preceding year. However, it is off the pace set during the first six months of 1959, and unless production was greater during the last half of the year, the total output for 1960 will probably

be under 200,000 tons.

Production in 1959 dropped considerably from the relatively high level of the preceding year. The 195,000 tons of processed ore recorded show the effects of the steel strike of that year. Although shipments of metallurgical grade material were down by more than 50 percent, acid grade fluorspar did not show nearly so strong a decline. During the first six months of 1960 shipments of both grades were higher than during the corresponding period of 1959.

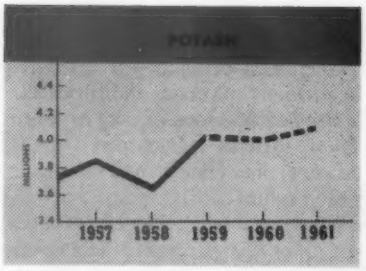
Imports for consumption were 42 percent higher in 1959 than in the preceding year, and continued at a high rate during the January-June period last year. The total for 1959 was about 556,000 tons. The bulk of these imports originated in Mexico.




A new record was set in phosphate production during 1959, according to the latest complete annual figures compiled by the Bureau of Mines. Marketable production rose 7 percent to the new high for the industry of 15,870,000 tons (4,939,000 long tons $P_2O_5$ content). The quantity sold and used also rose, registering a gain of 9 percent.

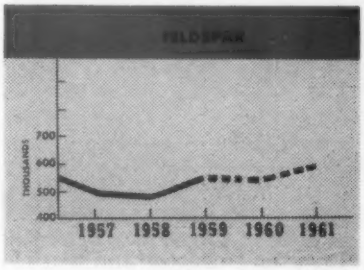
► Consumption, up 8 percent over 1958, reached a new high of more than 13,000,000 tons. Of the total rock processed, about 80 percent was utilized in agricultural applications.

Late last year the Bureau of Mines announced research projects concerning the phosphate industry. One project involves field testing of a redesigned phosphate-rock planer in the western fields. Another involves beneficiation methods for upgrading rock from the western field. The phosphatic slime problem in Florida and Tennessee is also scheduled for Bureau study.




This industry continued its steady growth during 1959 and, according to Bureau of Mines figures, set another new record in both production and sales. Apparent consumption and imports also showed gains, as did exports of fertilizer and chemical-grade material.

► The record output of potassium salts was 4,033,000 tons (2,383,000 tons $K_2O$ equivalent), and sales amounted to $83,900,000 (4,190,000 tons of salts). Percentages of gain in production and sales tonnages were 11 and 6, respectively. Producers' stocks at the end of 1959 were reported at 464,000 tons of salts, the lowest in at least the last five years. In gaining 13 percent over the previous year, exports reached a new record of 572,000 tons. Imported tonnage rose 18 percent to 432,000 tons, a figure that is 33 percent less than exports.




After realizing a deceleration in 1958 of the slide that had started in 1957, the feldspar industry came back strong in 1959. In fact, it approached the record established in 1956. Crude feldspar production in 1959 was 548,400 long tons—an increase of 17 percent over the preceding year. A gain of 19 percent was recorded by ground feldspar, which reached a new high of 560,100 tons. Imports of crude and ground feldspar, entirely from Canada, dropped 38 percent.

Almost all crude feldspar mined was either ground by the producers or sold to merchant grinders. Glass consumed 56 percent, pottery 30 percent, and enamel 7 percent of all ground feldspar sold. Each of the three use categories above registered higher demands.

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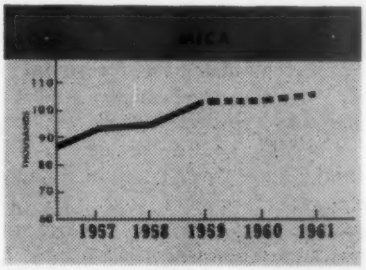


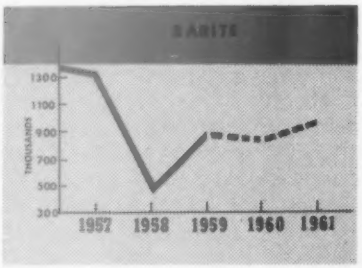

Supply and sales of domestic mica in 1959—the latest year of full tabulation by the Bureau of Mines—exceeded 100,000 tons for the first time in the history of the industry. This was an increase of 7 percent in tonnage over 1958, and an increase of 4 percent over 1955, the previous record year. The 1959 total was 102,000 tons.

► Sales of scrap and flake mica reached a new high at $2,645,000, and sales of sheet mica (larger than punch and circle) were higher—$3,383,000—than in any year since World War II. Much of the latter gain in sales value over 1958 (sheet mica) was due to government stockpiling at higher than market prices.

In sheet mica consumption, domestic fabricators used about 2,900,000 lb. of muscovite block and film. Of this amount, 65 percent was used in electronic applications.

Both imports and exports increased in 1959—the former by 11 percent (quantity) and the latter by 8 percent. General Services Administration issued notices that long-term contracts with importers for delivery of block and film mica from foreign sources would terminate on July 1, 1960.

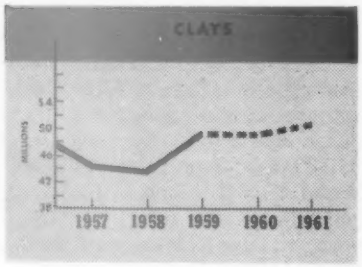
The Bureau of Mines has announced that research on materials to substitute satisfactorily for strategic block and film mica will receive continuing emphasis.




During 1959 the production and consumption of barite sharply reversed a decline that started two years earlier. Production amounted to 867,000 tons—and despite being 36 percent under the record high of 1956, this represented a healthy jump of 58 percent over 1958.

Consumption of crude barite (both domestic and imported) increased 17 percent, and sales of crushed and ground rose 18 percent, according to Bureau of Mines reports. The increase in consumption of ground material was largely due to requirements of well drillers.

Ground and crushed barite sold by producers was valued at $30,419,000.

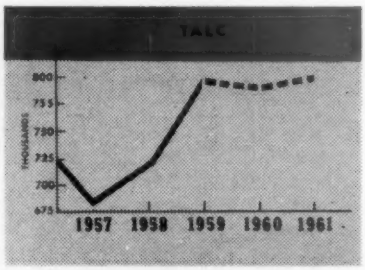



In 1959 the tonnage of clays consumed showed an impressive increase of 13 percent over that of 1958. Consumption rose to more than 49,000,000 tons, compared with approximately 44,000,000 tons in the previous year.

► All major types of clay—kaolin, ball, fire, bentonite, and Fuller's earth—enjoyed gains. By type, the following was recorded in 1959: kaolin—up 14 percent in value and quantity to a new high tonnage of more than 2,530,000 tons; ball clay—up 20 percent in tonnage and 17 percent in value; bentonite—up 6 percent in tonnage and 3 percent in value; Fuller's earth—up 14 and 19 percent respectively in tonnage and value; and fire clay—up 12 percent in tonnage and value.

Increased demand was registered by virtually all major industries utilizing 125,000 tons of clay or more. These include refractories (up 30 percent), insecticides and fungicides (31 percent), whiteware and absorbent uses (each 21 percent), paper filler 20 percent), lightweight aggregate and rubber (each 14 percent), portland and other hydraulic cements (11 percent), heavy products (9 percent), paper coating (7 percent), floor and wall tile (4 percent), rotary drilling mud and mineral oils and greases (each 3 percent). The only large consumer showing less demand was chemicals, and the drop was only 2 percent.

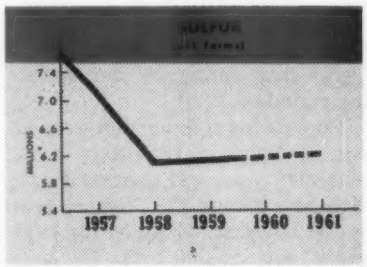
Bureau of Mines research activity in the development of super refractories is receiving continued emphasis during the current fiscal year. Such materials are important to space programs as well as metallurgical and chemical processes. Field and laboratory work is also current on nonrefractory clay projects, particularly in reference to lightweight aggregates. This project involves exploration and evaluation of clays suitable for such processing and use.




Domestic production and sales of talc, soapstone, and pyrophyllite continued the climb initiated in 1958 (following a previous drop), and reached new record levels in 1959. According to Bureau of Mines data, 795,000 tons were mined, and 782,000 tons valued at $17,068,000 were sold. The latter two figures represent gains of 8 and 6 percent, respectively, over the 1956 records.

Imports rose about 8 percent, while exports remained at the same level as in 1958. Over two-thirds of the imports came from Italy.

Of all talc and soapstone sold by producers in 1959, about 82 percent (slightly higher than the previous year) was consumed by the ceramic, paint, insecticide, roofing, rubber, asphalt (filler), and paper industries. Ceramics and insecticides again used about 55 percent of the pyrophyllite sold.




According to the monthly Bureau reports, the production of native and recovered elemental sulphur by the domestic industry through the first eight months of 1960 amounted to slightly more than 3,700,000 tons. This represents an increase of about 15 percent over the rate during the corresponding period of 1959. Frasch sulphur accounts for about 89 percent of the eight-month total.

Based on the latest full annual report, production in 1959 was only slightly larger (all forms), at 6,168,000 tons, than in the preceding year. Of this amount, 75 percent was mined by the Frasch process.

► Consumption, however, reached a new record in 1959, according to the Bureau of Mines figures, and passed 1958 by 12 percent. The record level was attained despite a decrease in demand by the steel industry, due to strike conditions. That market loss, however, was reportedly more than offset by higher needs of fertilizer, chemicals, pulp and paper, pigments, and rayon manufacture.

A new high was reached by imports of Frasch sulphur, but there was a significant leveling from the sharp climb of the preceding four years. Exports also increased in the face of growing competition from more new foreign operations.

Sales of boron minerals and compounds during 1959 have been reported at 620,000 tons by the Bureau of Mines. The $B_2O_3$ content was approximately 314,000 tons.

# NEW!

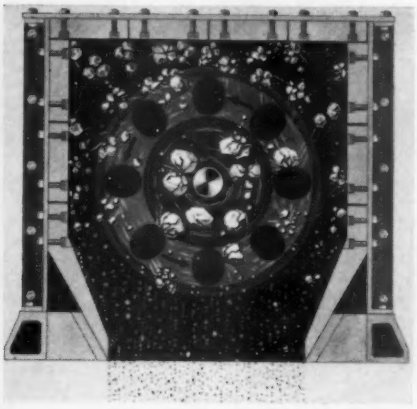
*Increase Your Profit-Potential!*
*Lower Your Cost Per Ton!*

# IMPROVED STEDMAN CAGE MILL

ADJUSTABLE FEED PLATE

Fig. 538

## STEDMAN CAGE MILL DESIGN . . .



***. . . will produce a more cubical product with less power and less maintenance than any other type of reduction unit considering results obtained. The Stedman Cage Mill reduces most materials, including the wet, sticky or gummy, without plugging or slowing the operation. It pulverizes unsound material, to be passed off with fines, leaving hard clean particles. It handles up to 50% recirculating load without build-up of near-size.***

**NEW ADJUSTABLE FEED-PLATE** permits quick adjustment for any type of material —wet or dry. Feed enters cage at pin center—eliminating uneven pin wear, increasing pin life and lowering Cost Per Ton!

**NEW HINGED-TYPE FEED HOPPER** permits easier access to interior.

**NEW CAGE DESIGN** includes more metal where it is needed—for longer cage life and lower Cost Per Ton.

**NEW TYPE HUB** greatly reduces time required to detach cage.

**MODERNIZE FOR PROFIT.** USE NEW DESIGN STEDMAN CAGE AND LINERS FOR YOUR EXISTING MILL, EFFECTING LOWEST COST PER TON. Take advantage of Stedman Design Improvements and Know-How. Stedman Advanced Engineering plus use of Genuine Stedman Parts, will keep your units more efficient and profitable!

**REMEMBER . . .** it is Cost Per Ton that produces your operating profit, NOT lowest initial price!

S

SINCE 1834

***For Complete Information on New Stedman Cage Mills, contact:***

**STEDMAN FOUNDRY AND MACHINE COMPANY, INC.**

Subsidiary of United Engineering and Foundry Company

GENERAL OFFICES AND PLANT — AURORA, INDIANA, U.S.A.

FOUNDED 1834

# CHEVROLET IFS "WALKS" WHEELS OVER TRUCK-BUSTING BUMPS!

IFS = FRONT INDEPENDENT SUSPENSION

Chevrolet truck wheel action on rough road surface, as depicted by 4-stage stop-action photography

# CHEVROLET I.F.S. (FRONT INDEPENDENT SUSPENSION) PROTECTS YOUR PROFITS THESE THREE WAYS:

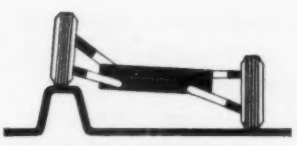
**1** *Rides down high maintenance costs.* When a bump looms up, Chevy's independently suspended front wheels "walk" right over it. Most road shocks and jolts never reach the chassis, cab or body. The truck rides *smoothly*, takes less of a beating, stays in cost-saving shape longer. Your income doesn't dribble away in big repair bills. And you don't lose money through excessive downtime, either.

**2** *Rides cargoes over rough spots with less damage . . . minimum loss.* Thanks to those same "walking wheels," loads don't do much bouncing in the body of a '61 Chevy truck. That means you don't have to contend with undue cargo damage that eats away at your earnings. (Chevy's load-tailored *rear* suspension helps protect cargoes, too.) This sure protection for fragile loads—and profits—is standard in 1961 Chevrolet trucks of every weight class.

**3** *Rides drivers through with less fatigue—for tighter schedules.* Wait till you see how Chevy front wheel action works to eliminate tiring shimmy and steering-wheel fight. It means that the man at the controls can stay there longer with less fatigue—stay on schedule and do a bigger day's work. (Another reason you can look for faster schedules is that Chevy's bump-beating wheel action allows faster safe speeds on rough roads.)

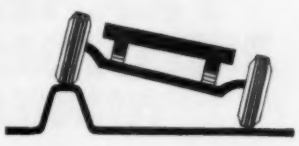
That gives you an idea of how Chevy Independent Front Suspension works to move you ahead in the money-making department. And it's available in 165 Chevrolet models for '61, from new Corvair 95's to 36,000-lb. GVW tandems. Check it out with a demonstration ride at your Chevrolet dealer's, sometime soon. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**INDEPENDENT FRONT SUSPENSION**



In Chevy, each front wheel, suspended independently, is free to step cleanly over bumps (see left). Each works smoothly to reduce objectionable jolts so characteristic with I-beam axle design (right). Working with load-tailored rear suspensions in every weight class, I.F.S. provides the basis for profit-protecting performance that's unmatched by I-beam axle trucks.

**I-BEAM AXLE DESIGN**



## 1961 CHEVROLET STURDI-BILT TRUCKS

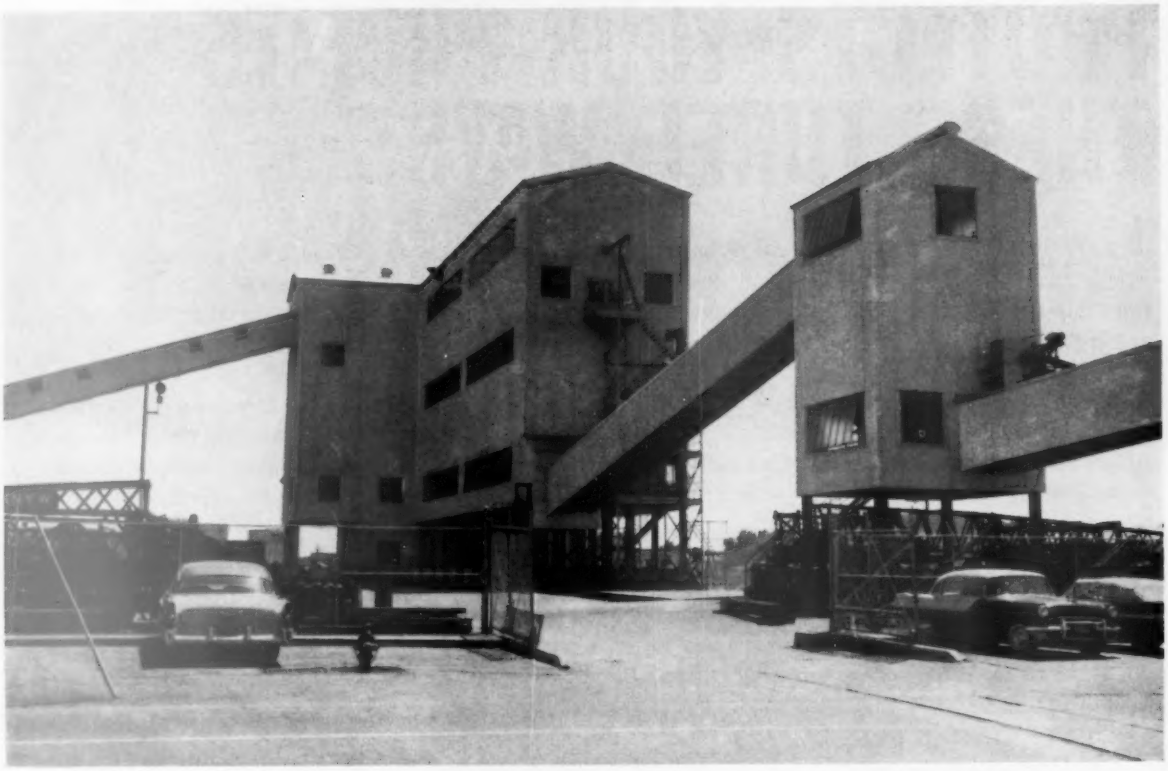
CHEVROLET

# CRUSHED STONE FACILITIES

## for

## GEORGE M. BREWSTER & SONS, INC.

## BOGOTA, N. J.



DESIGN and CONSTRUCTION
by
**WILLIS & PAUL, INC.**
ENGINEERS AND CONTRACTORS
BRANCHVILLE, N. J.
PHONE: WINDSOR 8-3700

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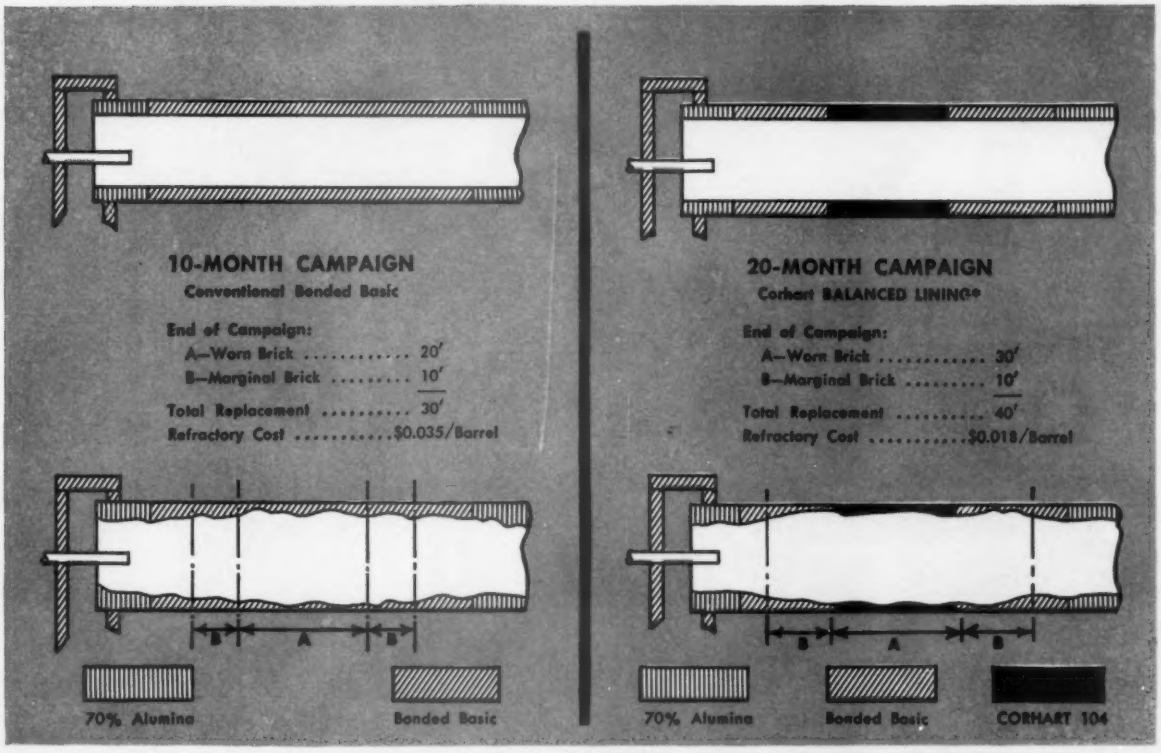
**WILLIS & PAUL, INC. ENGINEER AND CONSTRUCT COMPLETE PLANTS FOR:**
**AGGREGATES — LIME — GYPSUM — MINES and HEAVY INDUSTRY**

# CORHART PROVES IT IN THE HOT SPOTS!




# Will you pay 50% more to increase hot zone refractory life by 100%?

CORHART 104 costs somewhat more than conventional basic refractories. But for a very good reason. Corhart 104 is an electrically-melted, high-density refractory which outlasts other basic hot-zone liners by more than 2-to-1.

Many leading cement producers are using Corhart 104 to eliminate small, costly "hot spots" in their kiln hot zones. These are the troublesome wear areas which repeatedly cause premature repair shutdowns before major refractory replacement takes place.

Surprisingly small amounts of this ELECTROCAST refractory in a Corhart BALANCED LINING* permit better utilization of conventional refractories and economically increase kiln refractory life.

Send for your free copy of the full-color brochure illustrating the many advantages of Corhart 104 BALANCED LININGS. Corhart Refractories Company, Incorporated, 946 Commonwealth Bldg., Louisville 2, Kentucky.

**Trade Mark*

QUALITY ECONOMY ENDURANCE

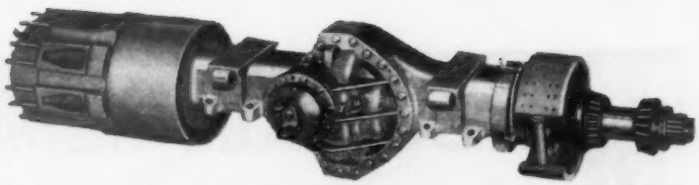
**CORHART REFRACTORIES COMPANY**

Subsidiary of Corning Glass Works

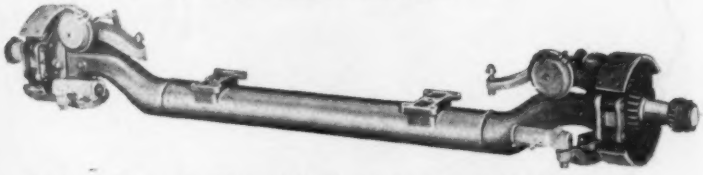
The words "Corhart", "ZAC", and "Electrocast" are registered trade marks which indicate manufacture by Corhart Refractories Company, Incorporated.

# *NEW...* MACK 30-TONNER

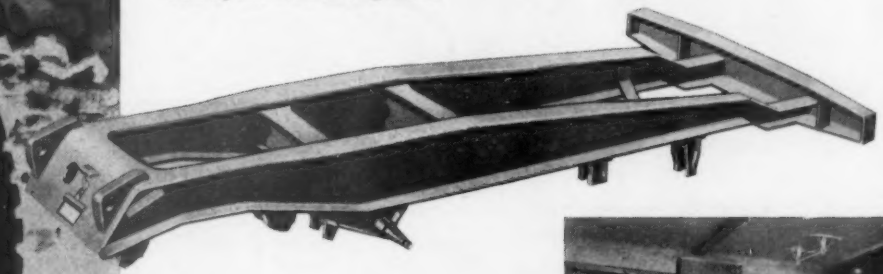
*...designed to make your tough jobs easier*



**Heaviest-duty Mack rear axle, combining hypoid carrier with Planidrive®, keeps M-30X hustling where others bog down.** The new M-30X boasts one of the strongest, longest-lived rear axles of any four-wheel dumper in the field. Drive is through exclusive single-reduction hypoid Mack carrier, with planetary gears in wheel hubs. Suspension is by extra long, extra broad semi-elliptic progressive-rate leaf springs with cam-faced slipper ends and radius rods.



**New tubular front axle withstands heavier loadings.** Steel tubing, seven inches in diameter, with walls ¾" thick is welded to cast ends to provide a reversed Elliott front axle that withstands the most punishing loads of quarrying, construction or mining. Extra wide tread gives maximum stability and short turning radius.



**Five-crossmember, alloy steel frame shrugs off jarring drop loads of big shovels.** Typical of Mack off-highway truck construction practices, the frame of the M-30X Model is extra solid, extra strong. I-beam main rails are tied together by five welded crossmembers to prevent stress concentrations.

**New, massive functional cab for easier truck handling . . . extra driver comfort.** The M-30X cab is not only rugged, but completely functional. Offset design provides maximum vision for quicker spotting and dumping and safer operation. Forward position permits heavier loading of new set-back front axle.

Meet the new Mack four-wheel dumper chassis that meets the most challenging, rigorous, heavy-duty jobs in mining, quarrying and construction—the M Model 30-Ton Dumper.

Visually, the silhouette of the new M-30X exhibits efficient, modern lines that are unmistakably Mack from the new, spacious and functional cab to a rear axle that is one of the sturdiest and most trouble-free of any four-wheel dumper in the field.

Beneath visual ruggedness lie the time-proved features that have won Mack construction trucks worldwide fame for complete reliability and performance. In addition, there are many M Model exclusives that make it even more maneuverable, rugged, dependable and safe.

Sure to be first choice among those who must haul huge tonnages profitably, the M Model is ready for your most critical appraisal. See your Mack branch or distributor for the full story of its capabilities. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

8011

**MACK**
FIRST NAME FOR
**TRUCKS**

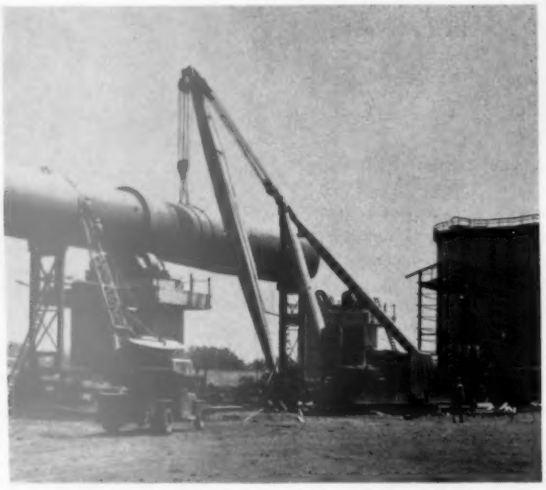
*Enter 124 on card, page 183*

# MACDONALD Installations in 1960

- **LONE STAR CEMENT CO.**
  Nazareth, Pennsylvania
- **MARQUETTE CEMENT MFG. CO.**
  Nashville, Tennessee
- **MISSOURI PORTLAND CEMENT CO.**
  Prospect Hill, Missouri (near St. Louis)
- **MISSOURI PORTLAND CEMENT CO.**
  Sugar Creek, Missouri (near Independence)
- **MONARCH CEMENT CO.**
  Humboldt, Kansas
- **NORTHWESTERN STATES PORTLAND CEMENT CO.**
  Mason City, Iowa
- **OKLAHOMA CEMENT CO.**
  Pryor, Oklahoma
- **TEXAS INDUSTRIES, INC.**
  Midlothian, Texas

- **ASH GROVE LIME & PORTLAND CEMENT CO.**
  Chanute, Kansas
- **GIANT PORTLAND CEMENT CO.**
  Harleyville, South Carolina
- **KEYSTONE PORTLAND CEMENT CO.**
  Bath, Pennsylvania

KEYSTONE PORTLAND CEMENT CO.



KILN ERECTION, NORTHWESTERN STATES PORTLAND CEMENT CO.

## MACDONALD
### COMPLETE SERVICE

***LAYOUT AND DESIGN FOR BIDS AND CONSTRUCTION***

## MACDONALD ENGINEERING CO.

**Constructing Engineers**

149 New Montgomery St.
San Francisco, Calif.

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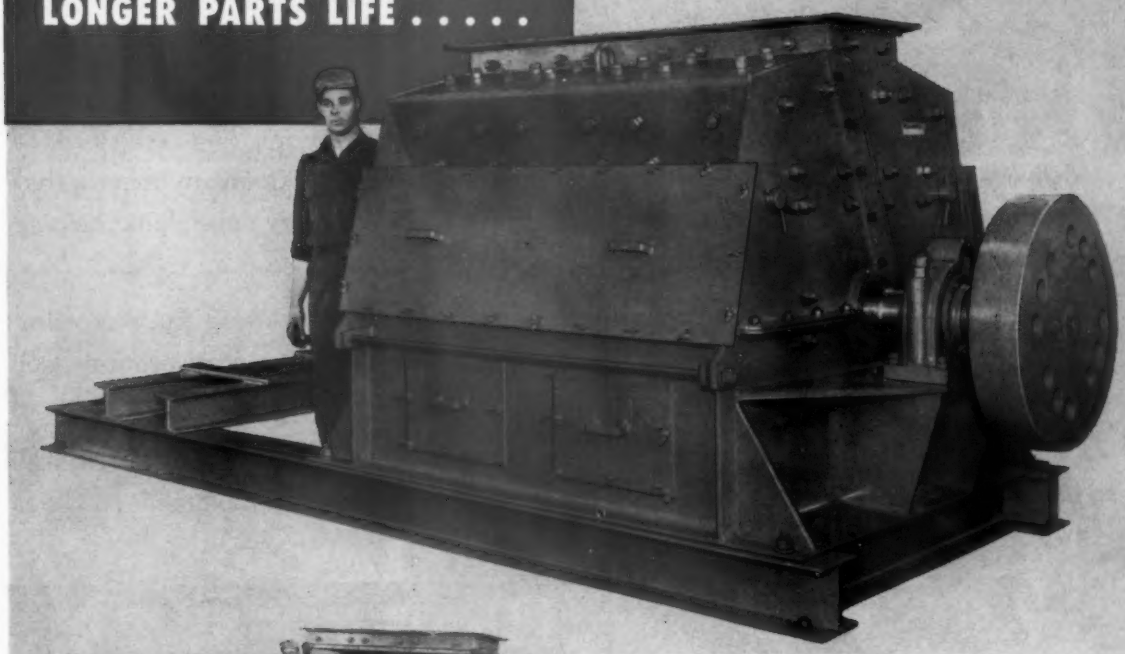
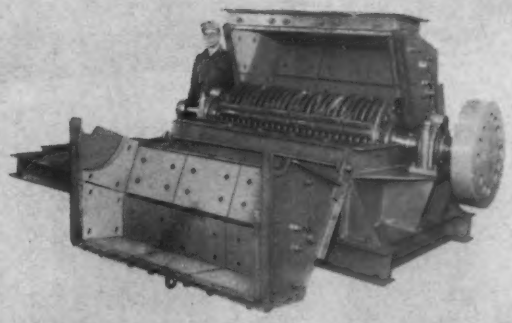
Toronto, Canada

# NEW DUAL "2-POINT" ADJUSTMENT INSURES MORE UNIFORM GRINDING, LONGER PARTS LIFE . . . . .

## WILLIAMS *Reversible* HAMMER MILLS





Williams Reversible Hammer Mill with cover open. Note these features:

- Super-strong reinforced steel plate frame
- Renewable wear-resistant manganese steel liners
- Heavy duty oversize forged steel rotor shaft
- Anti-friction self-aligning roller bearings in dust-tight housings
- Complete accessibility to interior for quick parts changing

***It's another Williams "first"***—features not available in other hammer mills—that now makes it possible to maintain the original close clearances of *both* grinding plates *AND* cage sections against the rotating hammers. This easy-to-make "2-point" adjustment, in the most critical grinding area inside the hammer mill, gives absolute assurance of consistently uniform product quality.

In addition to the advantages of the Dual "2-Point" Adjustment, a Williams Reversible Hammer Mill substantially lowers upkeep expense by cutting hammer cost. Hammers can be operated in one direction today and another tomorrow simply by installing a simple reversing switch on the driving motor. Manual reversing of hammers no longer necessary. Grate bars also last longer. The double set of reversible manganese breaker plates, which last twice as long as other types, give four times the service! Maintenance and downtime are cut 50% or more.

Get all the facts about the hammer mill with *ALL* the top features.

**WILLIAMS PATENT CRUSHER & PULVERIZER CO. • 802 ST. LOUIS AVE. • ST. LOUIS 6, MO.**

**WILLIAMS**
CRUSHERS • GRINDERS • SHREDDERS
*Oldest and Largest Manufacturers of Hammer Mills in the World*

# "Jeffrey equipment is excellent...in use throughout our operations to make a fine product"

...George E. Karch, *President, Karch Stone Company, Celina, Ohio*

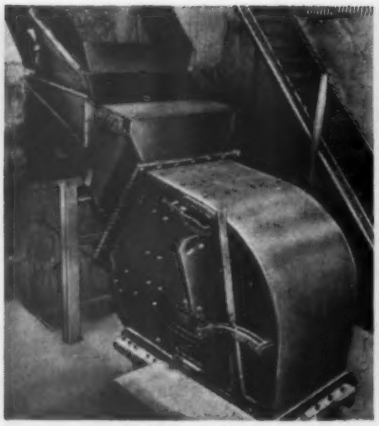
This modernized quarry operation has stepped up production using Jeffrey equipment in virtually all operations, from crushing heavy stone to feeding and conveying, to delivery of finished sized stone and agricultural limestone. The Company reports that operation and performance of the Jeffrey equipment has been very dependable, helping to produce high quality products.

Jeffrey serves every basic industry with *mechanization* . . . conveying and processing equipment, transmission and mining machinery. Sales-engineering service worldwide; standard products stocked by authorized distributors.

Use Jeffrey's broad line of experience to get greatest efficiency in your heavy industrial plants. The Jeffrey Manufacturing Company, 917 North Fourth St., Columbus 16, Ohio.

JEFFREY

**1.** Jeffrey electric vibrating feeder delivers incoming stone to crusher.

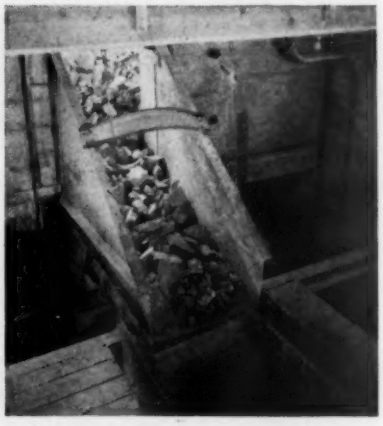


**2.** Jeffrey Rockbuster reduces material to minus 3 inch size.

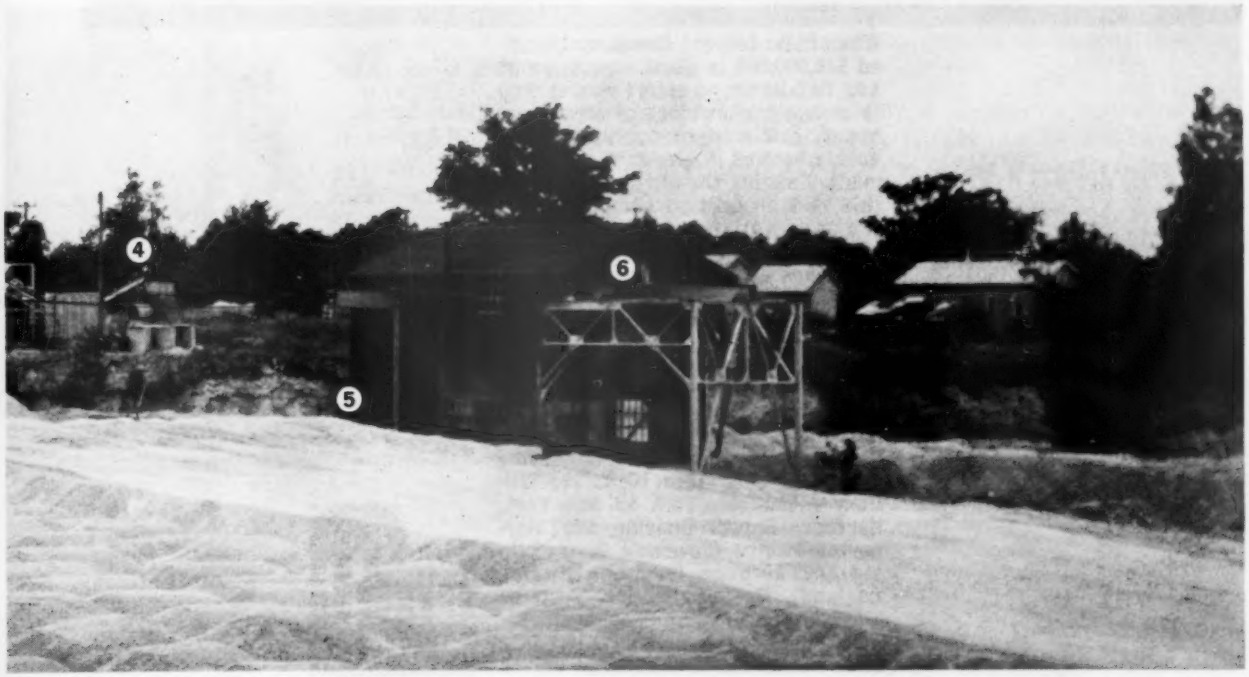
**3.** Jeffrey belt conveyor handles crusher product.

**4.** Mud Hog and conveyor idlers.

**5.** Jeffrey feeder.



**6.** Jeffrey feeder.

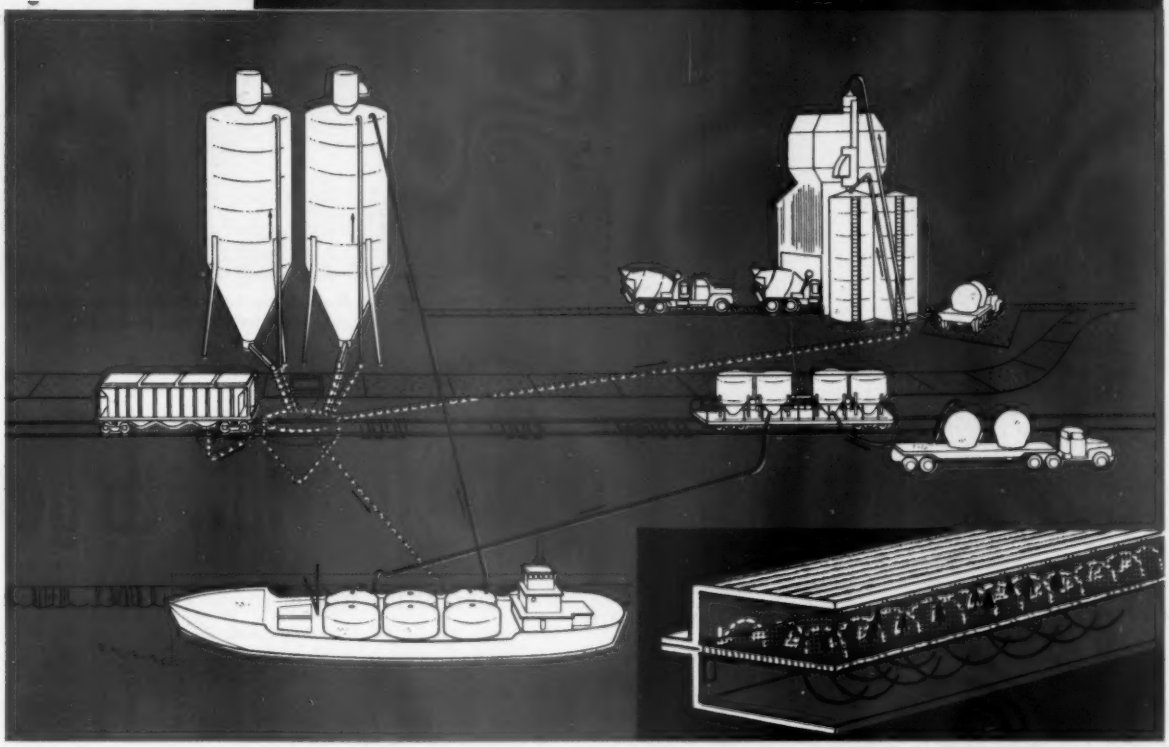


When Ideal Cement Company invested $20,000,000 in plant expansion at Ada, Oklahoma, no effort was spared to create a showpiece of structural beauty and modern operating technology housed in gleaming white cement. Cleaning the air in and around this vast production complex is the job accomplished by Buell-Norblo equipment. You'll find Norblo Dust Arrestors at work in the finish mill and packhouse, a Buell Collector and Electrostatic Precipitator cleaning the kiln gases and Buell Cyclones handling clinker cooler vent air. Here, as in other plants where the accent is on the modern and the efficient, you'll find Buell-Norblo doing the job best. The Buell Engineering Company, Inc., Dept. 18-A, 123 William Street, New York 38, New York, Northern Blower Division, 6407 Barberton Avenue, Cleveland, Ohio. (Subsidiary: Ambuco Limited, London, England). Dust Collection Systems · Cyclones · Electric Precipitators · Bag Collectors · Combination Systems · Classifiers · Discharge Valves

buell Norblo

HALLIBURTON **bulk handling** SYSTEMS

*. . . tailored to your needs* ***pneumatically!***



If the movement of dry bulk materials is important in your business . . . your plant . . . or operations within your plant . . . *you will profit* with some of the material handling ideas shown in the drawing above.

This hypothetical arrangement illustrates the flexibility of Halliburton Pneumatic Bulk Handling Equipment and Systems. The heart of a Halliburton System in moving powdered, granular, and most pelletized materials, is in the air pressure pumps which move materials rapidly in a closed system.

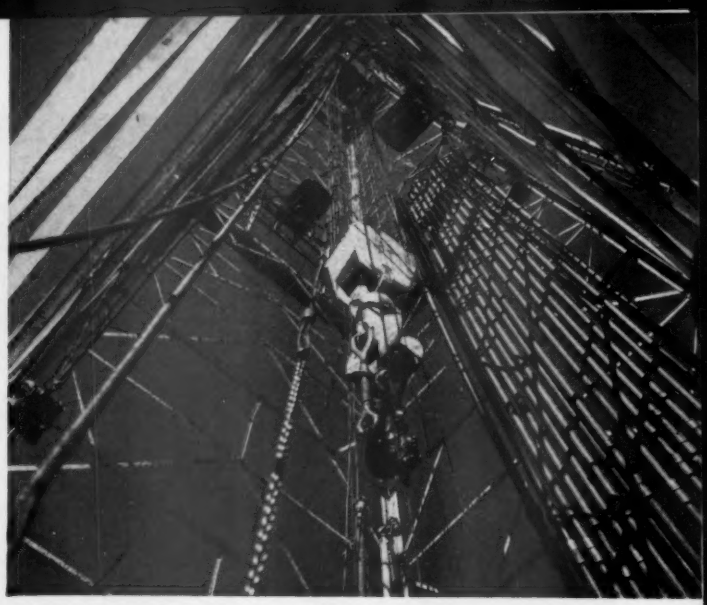
Halliburton manufactures complete units for over-the-road and rail transport, as well as systems for marine installation. Complete design and turnkey installation of custom-engineered Pneumatic Handling Systems is also available from Halliburton.

*Find out how clean, efficient pneumatic materials handling can work for you! Contact your Halliburton Representative, or write direct to . . .*

## SPECIAL PRODUCTS DIVISION

LOW COST MATERIAL ROUTING . . .
*anywhere you can run a pipe!*

**Halliburton**
COMPANY DUNCAN, OKLAHOMA



**Drilling for oil**—USS Tiger Brand Rotary Drilling Lines on one of the world's deepest wells—combine strength, toughness and long service life.

From the Tiger's mouth—

# How to get

Regardless of the type of equipment you operate or the size, grade or construction of the wire rope you use—when you get better service from that wire rope you save money.

Proper selection and care of your wire rope will pay off in longer rope life and consequent operating economy. Here are 10 ways to increase the life of wire rope:

**1. Get the right rope.** Carefully examine the operating requirements for your rope, determine how heavy the loads will be, how much abrasive wear, distortion, or crushing the rope must withstand, and how flexible it must be. Then choose the USS Tiger Brand Wire Rope that has the properties you need . . . there is one for every type of job.

**2. Unreeling.** To prevent kinking, be sure the reel or coil is free to rotate as the rope unwinds. Mount reels on an unreeling stand or on a shaft supported by two jacks. Otherwise, hold the rope end and roll the reel along the ground to unwind the rope. Always use this latter method for coils.

**3. Sheaves and drums.** Align all sheaves. Be sure that sheaves and drums are free to rotate and large enough in diameter to prevent sharp bending. Grooves must be slightly larger than the rope diameter and, if scored or badly worn, should be reground before new ropes are installed. Sheaves with broken flanges should be replaced immediately.

**Strip mining**—USS Tiger Brand Hoist Rope for strength with flexibility, Tiger Brand Drag Lines for strength with abrasion resistance, and Tiger Brand Boom Supports for high resistance to vibration fatigue.

**Building a super highway**—USS Tiger Brand Shovel Rope, Dozer Rope and Scraper Rope give longer service with less down time.

**Lifting industrial loads**—USS Tiger Brand Slings lift the heavy loads safely. Crane hoist ropes provide strength and flexibility.

# more service from your wire rope

**4. Wire rope fittings.** Install sockets, clips, swaged fittings or spliced loops or thimbles depending upon service requirements. Tiger Wire Rope Sockets, properly attached with molten zinc, develop the full strength of the wire rope.

**5. Seizings.** To prevent untwisting, apply seizings to the ends of any non-preformed wire rope that is not attached to permanent fittings. When you cut a non-preformed wire rope, apply seizings on both sides of the cut to prevent distortion.

**6. Lubrication.** Lubricate your ropes regularly with Tiger Lube Wire Rope Lubricant to cut down internal wear and reduce corrosion.

**7. Cutting back.** It is often advisable to change the position of a rope on sheaves and drums by cutting short lengths of rope from the drum end. This distributes wear more evenly, prevents fatigue from concentrating at any one section of the rope, and increases rope life. If you plan to cut back, order your ropes a little longer than normally required.

**8. Reverse ends.** Reversing a rope, end for end, will increase its life if half of it gets most of the wear. Reversing distributes wear and fatigue evenly throughout the rope.

**9. Storing wire ropes.** If you take a rope out of service for any length of time, clean and lubricate it thoroughly. Then store it in a dry place, protected from the weather.

**10. When in doubt.** If you need help in selecting the right rope or in setting up good maintenance procedures, call in a Tiger Brand Wire Rope Engineer. He can give you expert advice on any wire rope problem. Just call our nearest distributor or send the coupon.

*USS and Tiger Brand are registered trademarks*

**American Steel & Wire Division of United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
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# Project Aggregates From Project Site

By WALTER E. TRAUFFER

THE GEORGE WASHINGTON BRIDGE across the Hudson River, as viewed from the New Jersey end, where the construction described in this story is taking place. A second level to the bridge is being added at a cost of $183,000,000.

ANOTHER ON THE SPOT report

ONE OF THE most spectacular construction developments now going on in the New York area is the conversion of the famous George Washington Bridge across the Hudson River into a double-decker in order to adequately handle the growing volume of traffic. The new deck will be below the present level and will increase the traffic lanes from the present 8 to 14. This project, which will cost the New York Port Authority $183 million, will be completed in 1962. It should be added that this project is possible because provision for such an addition was made when the bridge was built in 1925.

Unusual methods are being used to achieve various phases of this unique engineering project. Not the least interesting of these is the use of the stone excavated for the lower level bridge approaches and tunnels on the west or New Jersey end as the aggregate for the concrete construction work involved, including retaining walls and roadways. This procedure takes care of the problem

● ***Geo M. Brewster's new crushed stone plant processes stone excavated for second level of George Washington Bridge for use as concrete aggregate in its construction***

DRILLING AND BLASTING for the approaches to the new lower bridge level. The shovel is loading 10-cu. yd. trucks for the primary crushing setup at the site.

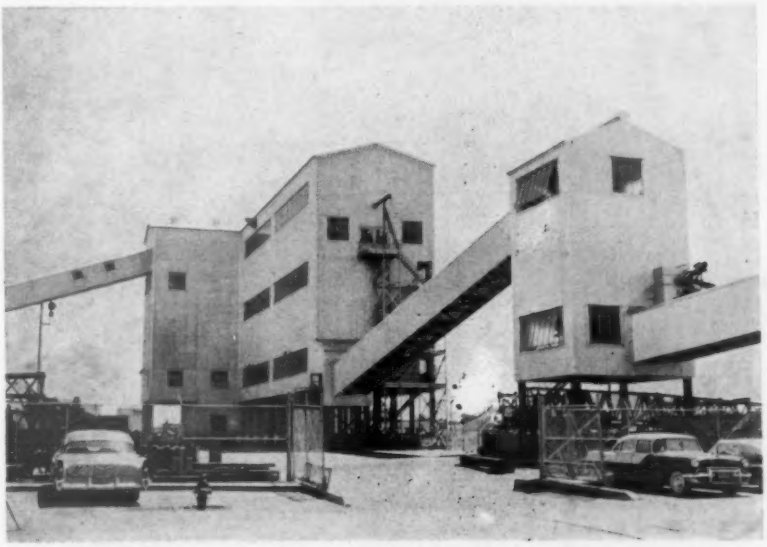
of disposing of the rock removed. The 300-t.p.h. crushed stone plant processing the rock consists of a primary crushing plant at the west end of the bridge which reduces it so that it can be hauled to the final processing plant in Bogota, N. J., 6 miles west.

This unique crushing operation is owned by Geo. M. Brewster and Son, Inc., of Bogota, N. J., a general contracting firm specializing in large earth-moving, concrete bridge, and asphalt paving projects. It is the first such plant operated by this company since the early 1930's. Previously it had operated several commercial or project plants, notably one at North Bergen, N. J.,* which was one of the most advanced operations in existence when it was built in 1931.

The company now operates ready mixed concrete plants on some of its construction projects but no other aggregate plants. Its ready-mix plant for this project is located about a mile from the construction site. The new crushed stone plant at Bogota, built in the firm's main yard there, also supplies a large aggregate bituminizing plant and a recently completed batch and central mix concrete plant; and some stone is also available for other construction contracts held by the company.

*(continued)*

A GENERAL VIEW of the 300 t.p.h. crushed stone plant built by Geo. M. Brewster & Son, Inc., to process excavated stone for use as concrete aggregate on this project. The transfer building and the conveyor to the agbit and ready-mix plants are at the right.



*See PIT AND QUARRY January, 1932, page 87, for a complete description.

Previously stone had been purchased and barged in to this yard. After completion of the bridge project this procedure can be resumed, but there are also good rock deposits available within reasonable truck or rail haul.

The Brewster firm was awarded the contract to build two approach tunnels through the Palisades on the New Jersey side of the bridge leading to the new lower deck. This work involved the removal of 350,000 cu. yd. of rock from three adjacent contracts. As this rock meets all specifications for concrete aggregate, the problem of its disposal was easily solved.

Construction of the new lower level was begun in September, 1958, and final completion is scheduled for mid-1962. The crushing and screening plants went into operation in January, 1960. When the bridge is completed, the primary crushing plant at the bridge will be moved.

In addition to the usual problems encountered in designing a modern and efficient crushed stone plant, several special conditions had to be carefully considered in the design and layout selected. Some of these are as follows:

The main plant is located in an urban area, which required careful control of dust and noise.

The plant is located in the company yard, with limited space available for storage piles. Therefore maximum flexibility as to production was required. Space limitations also required a compact plant fitted to existing roads and buildings.

The poor nature of the ground required piling under all structures and foundations designed to eliminate vibration. All screens are rubber-mounted with no mechanical connection to supporting structures.

Good appearance, ease of clean-up and ease of maintenance were required to conform to the owner's high standards in these regards. The plant is all-steel-and concrete construction, with corrugated aluminum siding and large window areas, and interior lighting is adequate.

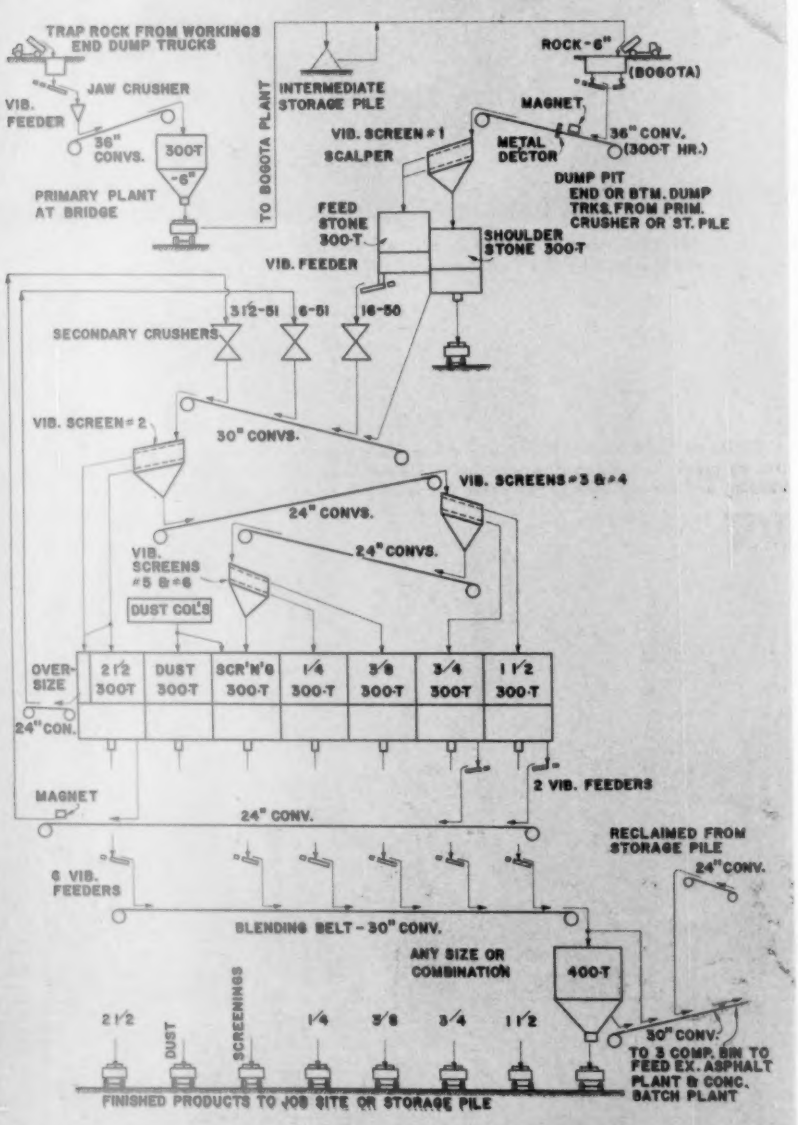
Chutes were eliminated wherever possible in favor of stone boxes to reduce noise, wear, and maintenance.

At the bridge the blasted rock is loaded by 2½-cu. yd. shovels into 10-cu. yd. Koehring Dumptors. These units haul it 1,500 ft. to the Jeffrey 60- by 138-in. vibrating feeder ahead of the 48- by 60-in. Kennedy-Van Saun jaw primary crusher, which is driven by a 200-hp. Westinghouse motor. The 8-in. minus crushed rock is carried by a series of two 36-in. Hewitt-Robins belt conveyors, respectively 120 and 87 ft. long, to a 300-ton truck loading bin, which has two air-operated undercut loading gates.

A fleet of six tractor-trailer units, with Mack diesel tractors and 20-cu. yd. Cook Bros. bottom-dump trailers, hauls the rock 6 miles, most of the way on high-speed freeways, to the processing plant in Bogota. These trailers are supplemented when necessary by dump trucks. If desired, these trucks can haul to an intermediate storage area from which the rock can be reclaimed as needed. At the plant all trucks are weighed in on a 100-ton Howe scale, which is also used to weigh out all shipments of finished rock.

At the Bogota plant the rock is dumped into a double receiving hopper which can handle both trailer and end-dump trucks simultaneously. Two 60-in. Jeffrey vibrating feeders—the one for the

• FLOW SHEET of Brewster plant. Primary crushing installation at bridge site is at the upper left.

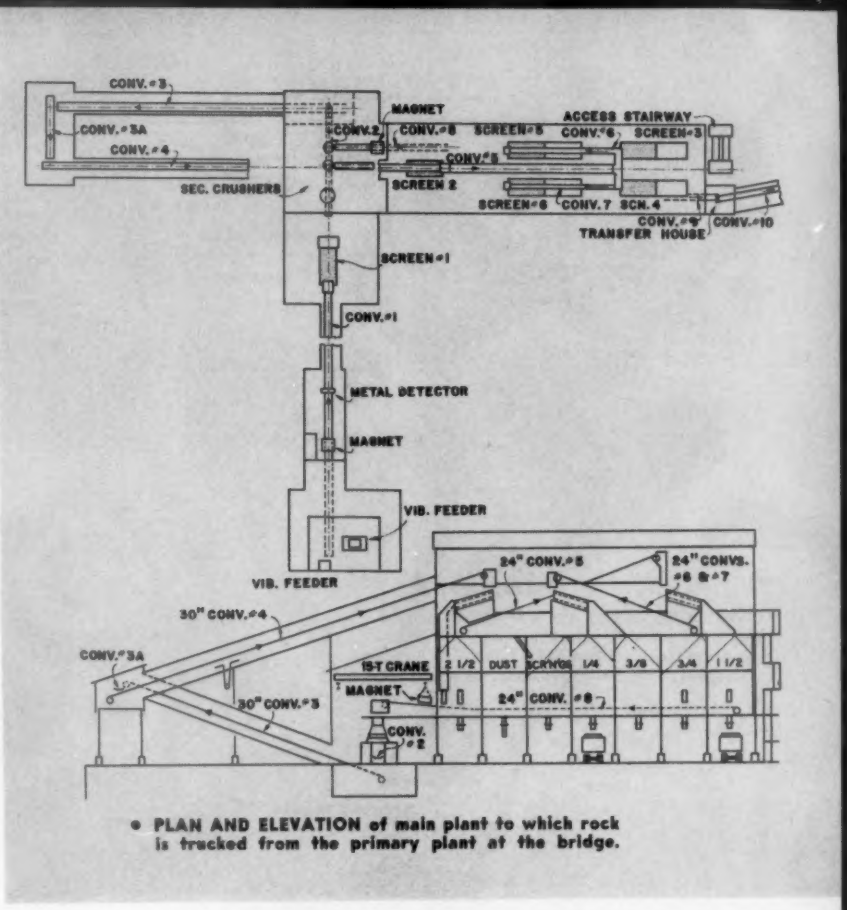


bottom-dump trucks 10 ft. long, and that for the end-dump trucks 5 ft. 6 in. long—feed the rock onto the main belt conveyor. Arching or jamming the rock in the hopper is prevented by strands of heavy anchor chain suspended over each feeder and extending through the discharge openings. These chains are in constant motion from rock impact, keeping the material loose and free-flowing. When necessary, these chains can be pulled back to break loose material by means of a truck and cable.

The main (No. 1) belt conveyor to the scalping screen, 36 in. by 250 ft., has a capacity of 300 t.p.h. at a speed of 260 f.p.m. This conveyor was originally equipped with an R.C.A. metal detector which stopped the belt when there was metal in the rock. Because the rock comes from a construction site, however, there was inevitably so much metal in it that the frequent stoppage of the belt for removal of the metal seriously interfered with production.

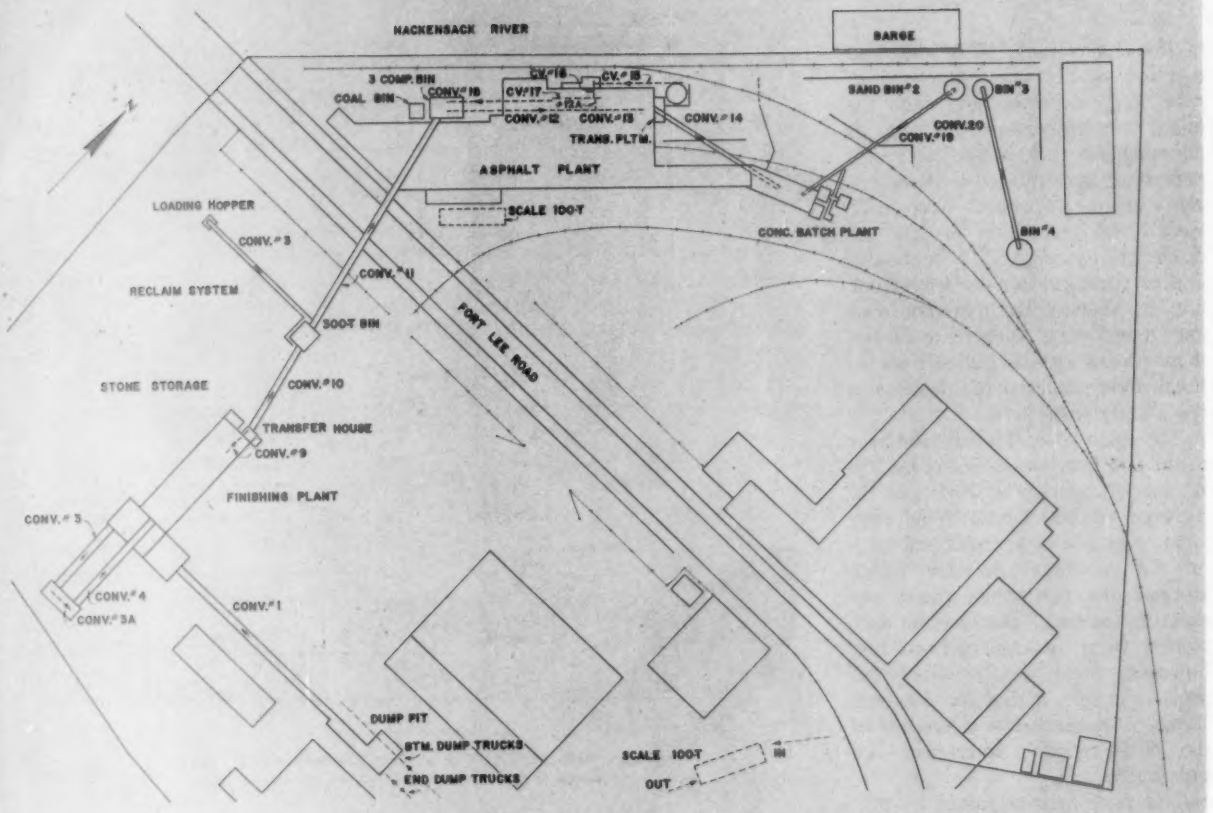
This problem was solved by putting ahead of the metal detector a 36-in. wide Magnetic Engineering & Mfg. Co. Series SE-1700 Electro Double Gap suspended magnet. Mounted 17 in. over the belt, this oil-cooled magnet is guaranteed to remove 98 percent of all tramp iron, down to and including ½-in. cubes, alloy steel dipper teeth, liners, etc. It is also catching rivet heads, bolts, and occasional large pieces of cast-iron water pipe from the construction site. During regular shutdown periods, an old piece of conveyor belting is placed under the magnet for removal of the metal, as shown in one of the illustrations. The metal detector now acts as a safeguard and stops the belt for any nonmagnetic metal such as manganese dipper teeth, etc.

Conveyor No. 1 discharges at the top of the building to the 5- by 12-ft. Tyler F800 Ty-Rock 2-deck scalping screen (No. 1). The top




• **PLAN AND ELEVATION of main plant to which rock is trucked from the primary plant at the bridge.**

**Right:**
**THE PRIMARY CRUSHING PLANT at the bridge site. Minus 8-in. rock is loaded from the bin into 20-cu. yd. bottom-dump truck-trailers and hauled to the main processing plant.**




• **GENERAL PLAN of the Brewster yard at Bogota, N. J., showing the crushed stone plant at the left and (above) the aggregate-bituminizing and ready mixed concrete plants.**

deck is equipped with 3-in. square perforated manganese steel plate and 2- by 3-in. square skid bars placed on edge 3 in. apart. The bottom deck has 1-in. wire screen cloth. The minus 1-in. rock through the bottom deck is shoulder stone and contains all the dirt in the raw material. This goes to a 300-ton bin, from which it is hauled by truck to a stockpile area.

The rock over both decks—1- to 8-in.—drops into a 400-ton feed bin from which a 42- by 72-in. Jeffrey vibrating feeder discharges it to the secondary crusher. This is an Allis-Chalmers No. 1650 Hydroset gyratory unit driven by a 200-hp. Westinghouse motor. It is now set at 1⅝-in. maximum opening, but this is varied from 1½ in. to 2 in. as required.

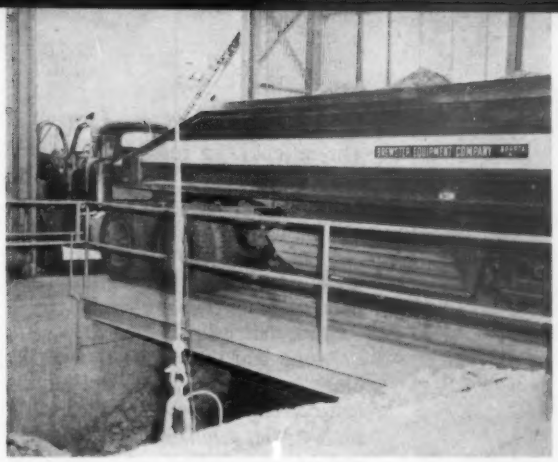
A 30-in. by 40-ft. horizontal belt conveyor (No. 2) carries the stone from this crusher and from two reduction crushers to a series of three 30-in. belt conveyors, No. 3, 3A, and 4, respectively 99, 24, and 135 ft. long, to the screening department. There is a Stearns suspended magnet over belt conveyor No. 3 to catch any remaining small metal ahead of the fine crushers. There the minus 1⅝-in. rock is discharged to the first of five 5- by 14-ft. Tyler F600 Ty-Rock 2-deck screens (No. 2) mounted over seven products bins, each of about 350-tons capacity. This screen has 2⅞- and 1⅞-in. wire cloth on its top and bottom decks, respectively.

The oversize off the top deck of this screen is chuted to a 24-in. by 20-ft. horizontal belt conveyor feeding an Allis-Chalmers No. 651 Hydroset crusher, set at $^{9}/_{16}$-in. maximum opening. The product goes to belt conveyor No. 2, forming a closed circuit. The 2¾- to 1¾-in. rock off the bottom deck of the screen goes to the 2½-in. bin.

Minus 1¾-in. rock through the bottom deck of screen No. 2 is carried on 24-in. by 67-ft. belt conveyor No. 5 to a pair of 5- by 14-ft. 2-deck screens (No. 3 and 3A) at the other end of the building These screens have 1⅛- and ½-in. wire cloth. The 1½-in. to 1-in. material over the top deck is chuted to the 1½-in. stone bin. That off the bottom deck goes to the ¾-in. stone bin.

The minus ½-in. material through the bottom deck of both screens is carried on 24-in. by 49-ft. parallel belt conveyors No. 6 and 7 to the final sizing screens, No. 4 and 4A, in the center of the building. These have $^{5}/_{16}$-in. wire cloth on their top decks and 8-mesh by 2-in. slotted cloth on the bottom. The three products of these screens are ⅜-in. and ¼-in. stone, and screen-

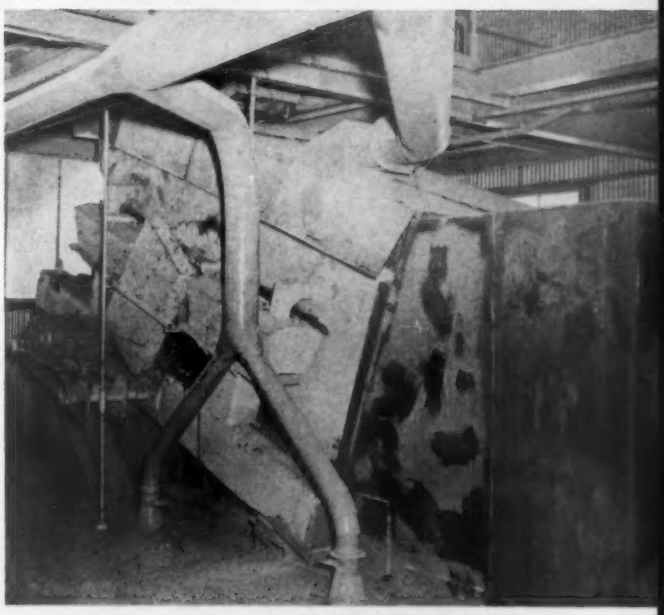
*(Text continued on page 140)*



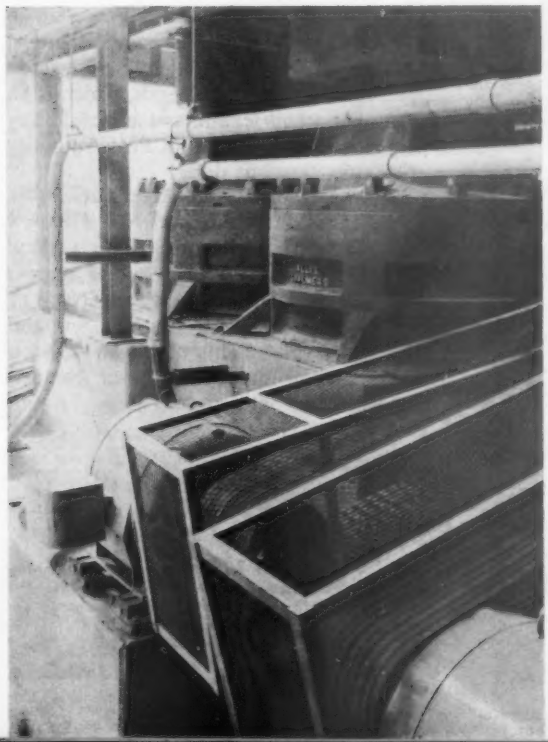
Left:
PLANT FEED being received from one of the 20-cu. yd. trailers. End-dump trucks discharge in the left foreground, into the dual plant feed hopper.

ANOTHER VIEW OF THE HOPPERS, showing the dangling strands of chain which help keep material loose and flowing. These can be pulled to break up jams.

THIS SUSPENDED MAGNET over the main belt conveyor removes all magnetic metal ahead of the reduction crushers. Recovered metal is dropped on an old belt section for removal, as shown here.

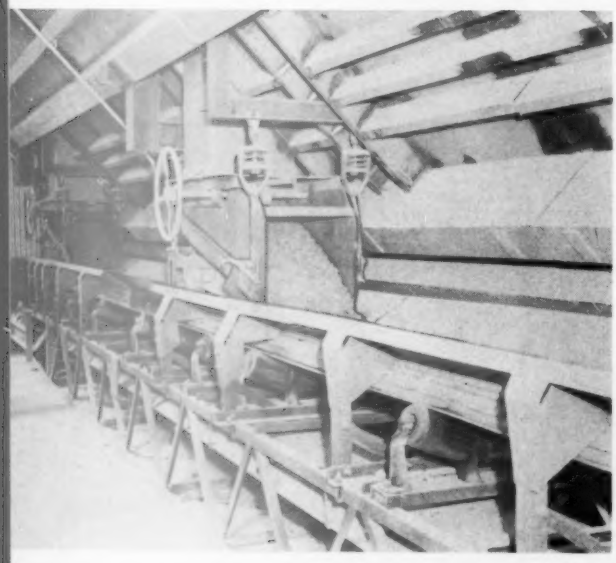


THE SCALPING SCREEN which diverts oversize rock to the secondary crusher. Note the complete enclosure and the connections to the dust collecting system.

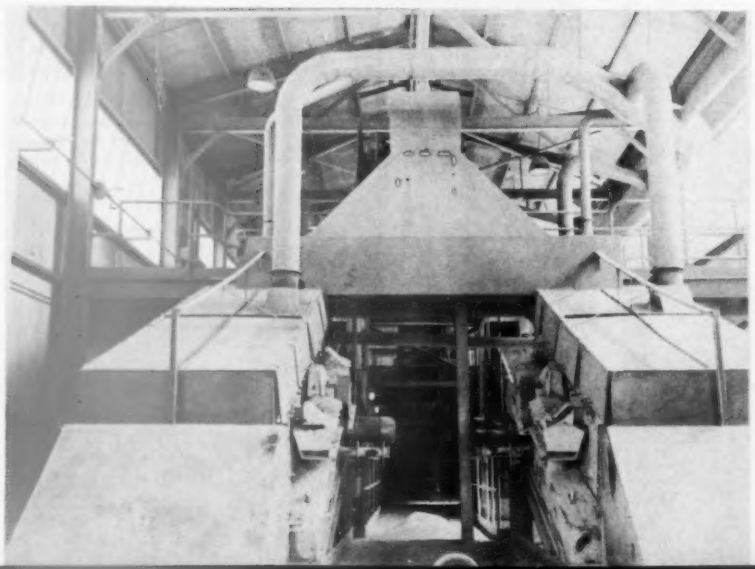


GYRATORY REDUCTION CRUSHERS make possible maximum flexibility in sizing. Two of the three used are shown here; the drive of the third is in the foreground.

Above:
THE SCREENING AND STORAGE BUILDING, with the crushing department in the background. At the far right is the 300-ton bin for minus 1-in. road rock.



Left:
THE CONVEYOR AND VIBRATING FEEDERS that are used to return from the bins stone sizes not currently in demand, for recrushing.



Left:
THE SCREEN ROOM houses the five sizing screens and the dust collector. Note the complete screen and conveyor discharge enclosures, and the collector ducts.

ings; all are chuted directly to bins. The seventh bin receives reclaimed dust from the two dust collectors in this building.

There are clamshell gates under each of these bins for direct truck-loading for the project or other business. Each gate is operated by a Schrader air cylinder.

Along and under one side of the bins there is a horizontal reclaiming belt conveyor—No. 8—which is 24 in. by 116 ft. This conveyor can reclaim any size or combination of sizes not in demand, for recrushing only. It is fed by 18- by 48-in. Jeffrey vibrating feeders under the ¾- and ½-in. stone bins. These are the only two sizes now recrushed as they are of least demand on this project. A Dings suspended magnet over this conveyor catches any remaining metal. The conveyor discharges the rock to a 3½-51 Hydroset crusher which reduces to $\frac{5}{16}$ in. minus. It also discharges on belt conveyor No. 2 in closed circuit.

The ¼- and ½-in. sizes are also trucked from the bins to stockpiles in the yard.

On the opposite side of the bins there is a 30-in. by 105-ft. horizontal belt conveyor (No. 9) which is used primarily for feeding straight or blended sizes to the aggregate bituminizing or ready mixed concrete plants on the property, or blended sizes for the bridge project. This belt is fed through six 30- by 60-in. Jeffrey vibrating feeders—one under each bin except the dust bin. These six feeders can be set to give any desired blends, which is an important feature as the New Jersey State and New York Port Authority specifications differ.

Conveyor No. 9 feeds to 30-in. by 106-ft. conveyor No. 10 to a transfer and loading building where gates permit feeding either onto a 30-in. by 237-ft. conveyor (No. 11) across the street to the agbit and ready-mix plants or into a 400-ton bin for direct loading of blended material into trucks.

BREWSTER'S AGBIT AND READY-MIX PLANTS, across the main highway, are shown in this view from the crushed stone plant. The transfer building is in the foreground.

There is a ground hopper and a conveyor for feeding stockpiled materials—now ¼- and ½-in. stone—onto belt conveyor No. 11.

Every precaution is taken to hold down dust in this plant. All equipment is inside buildings or housings, all screens are enclosed, and every dust point is connected to dust collectors. There is also a Johnson-March dust control system, with sprays at each of the two compartments of the truck hopper, at the feed and discharge points of each crusher, and at the blending belt conveyor, to wet the stone before it goes to the agbit or ready-mix plants or into trucks for delivery.

The two dust collectors in the aggregate processing building are Sly No. 130, Type 360 bag-type collectors rated at 25,000 c.f.m. each. The former has connections at 10 points of dust creation—at the crusher feed and discharge points, at the various feed belts, and at transfer points. The second collector has connections at 20 points, including the 7 bin feed points, the 6 screen feed points, etc. This dust is fed by screw conveyors into the dust storage bin. Some of this dust is loaded into trucks for use in blended sub-base. It is also planned to use some of it for asphalt filler.

The plant is automated to a high degree, an electrical control system allowing remote operation of the feeders and transfer points. There is a control center at the scalping screen, and there are also local controls at each unit in the flow. The main plant operating crew, as a result, is composed of only five men, one at the dumping pit, two at the crushers, one loading trucks, and one blending sub-base material.

The design of both parts of this unique crushed stone plant was done by Willis & Paul, Inc., engineers and contractors, Branchville, N. J. They designed it for a capacity of 300 t.p.h. when producing a full range of sizes, and it easily meets these requirements. Construction of these plants was done in co-operation with the Brewster firm.

Major equipment includes the Kennedy-Van Saun jaw primary crusher, three Allis-Chalmers gyratory crushers, six Tyler vibrating screens, and 12 Jeffrey vibrating feeders. Hewitt-Robins and Barber-Greene supplied most of the conveyors and belts. The new ready-mix plant at the yard is Chain Belt (Burmeister) equipped.

Officers of Geo. M. Brewster & Son, Inc., are: William J. Brewster, president, and Geo. M. Brewster, secretary-treasurer. Frank Hiller is superintendent of the crushed stone plant and other production facilities at the Bogota yard.

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### New Type of Wallboard Developed by N.Y. Concern

According to announcements released by spokesmen of Allied Chemical's Barrett Division, New York, this firm has started construction of a plant in Claymont, Del., for the manufacture of gypsum board chemically from a by-product of phosphoric acid. This will be the first such installation in the U. S.

It was indicated that the multi-million-dollar venture will be completed in 1961. Manufacture of the new type of wallboard will be accomplished by a process in which acid corrosion of machinery is avoided, and the product reportedly will be identical to that made from gypsum rock.

### Fluorspar Production Rises During Second Quarter

According to reports of producers to the U.S. Bureau of Mines, during the second quarter of 1960, total production of finished fluorspar totaled 53,600 short tons, which included almost 3,500 tons of material marketable as mined. This figure compares with first quarter production of 46,464 short tons.

Domestic mine production of crude fluorspar ore totaled 127,400 short tons. Mills processed 135,300 tons, from which 50,100 tons of finished fluorspar were recovered.

Whereas imports for consumption in this quarter were greater than those in the corresponding quarter of 1959, consumption actually declined.

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JAMES B. ROBERTS has been named field manager of the United States Gypsum Company service department. He joined the firm in 1950; since 1956 he has served as management-service engineer.

# BASIC FACTORS IN

# *Employee Benefit Programs*

This is the first in a series of articles designed to give producers a better understanding of the many factors involved in employee benefit programming. Subjects covered will include group life insurance, hospitalization, pension and profit-sharing plans, estate planning, executive compensation, and employee communications. The series has been prepared with the co-operation and assistance of Donald Shepherd and Company, Inc., benefit plans consultant to the National Sand and Gravel Association, National Ready Mixed Concrete Association, National Industrial Sand Association, and National Concrete Masonry Association. The Shepherd organization has representatives throughout the United States servicing the benefit programs adopted by member companies of these associations.

Whether you are a member of an industry association, or not, we believe that through a better understanding of the various types of fringe benefit plans, you as a producer will be assured of getting the maximum advantages from any such plan you now have in effect or which you may contemplate establishing.—The Editors.

LAST year American business and industry spent approximately $52,000,000,000 for various fringe benefit programs ranging from group life insurance to executive compensation plans. On a percentage of payroll basis, this averages just under 19 percent. What is the percentage figure for your company? Don't be alarmed if it varies considerably from the average; in compiling figures which establish this average, it was found that some companies were paying as little as 1 percent of payroll while some others which were paying as high as 35 percent felt that their programs were not adequate.

More important perhaps than the question, "How *much* are you spending?" is the question, "Are you getting *full value* for what you are spending?" To answer this latter question, you should have a full and complete understanding of the basic factors which must be considered in the design and servicing of each phase of your over-all program. This doesn't necessarily mean that you should become a so-called "expert" in this field. On the contrary, once you learn the basic concepts and objectives, your own good common sense and business judgment will enable you to make a realistic evaluation of what you have, what you are spending, and whether or not you are getting a fair return of your investment in fringe benefit plans.

## GROUP LIFE INSURANCE AND HOSPITALIZATION

In this first article the most prevalent fringe benefit program available today will be considered—group life insurance and hospitalization. Our approach will be based on the comprehensive Group Insurance Trust Fund established in 1953 by the National Sand and Gravel Association and the National Ready Mixed Concrete Association for their member companies.

The purpose of the association plan was to make available a program of coverages which could be adopted by individual member-companies regardless of their size and which, at the same time, would take advantage of the economies made possible by the mass purchasing power of an organized group.

**Group Life Insurance** When we take away the technical and legal terminology, group life insurance can be reduced to a fairly simple proposition, namely, a *group* of individuals banding together and making contributions to a fund which pays out a specified amount to the beneficiary of a member of the group upon his death. New members entering the group replace those who leave, thus making possible a constant input of monies.

While it is true that in a given case one member of the group may have put in only $10 and his beneficiary receives $1,000 upon his death, this doesn't mean that the plan is a disguised form of a "pyramid club." Over a period of time

(not considering, for the moment, interest and expenses) the claims paid out will balance with the monies paid in because in group insurance, as in everything else, you don't "get something for nothing." Thus we have our first basic concept, which may be stated this way:

*The company cost of its group life insurance program will be equal to the sum total of claims paid, plus expenses, less any interest earnings on monies held for claim reserves.*

Keep this cost concept in mind as we analyze our model plan—the National Sand and Gravel Association—National Ready Mixed Concrete Association Master Group Insurance Trust Fund—and you will note how the various provisions and objectives involved are related to it.

*The life insurance feature* of this model plan covers death from all causes and is based on the accompanying schedule.

**Amounts** Let us first consider the amounts of insurance listed in the accompanying schedule. Some may feel that they are high, while others may consider them too low. However, the point to remember is this: group life insurance should not be considered as a *substitute* or *replacement* for an employee's individual personal insurance program but rather a *supplement* to it.

The primary purpose of a company-sponsored group life insurance plan is to provide payment of a death benefit to supplement the amounts received by the employee's beneficiary from other insurance sources. (If the group insurance is the only coverage which the employee had, it may be considered as the fulfillment of a moral obligation which responsible management would feel towards its employees.)

**Classification and Age** You will note in the accompanying schedule that the amounts of coverage vary according to classification of employment and age. There are sound, logical reasons for doing this. Larger amounts *should* be payable in job classifications involving greater earnings, higher living standards, and therefore a greater need on the part of the beneficiaries of employees in these classifications.

The reduction in coverages at age 65 is based on the fundamental philosophy underlying all insurance —need. As a rule, an older employee does not have the family responsibilities and obligations which he had in his younger years; his insurance needs are therefore less than what they had previously been. Add the further fact that, as stated earlier, the cost of claims is borne proportionately by the companies participating in the plan, the continuation of the same amounts of coverage beyond age 65 is clearly inviting a higher over-all cost, when there is little or no justification for it.

**Cost and Contribution Rate** Under a group life insurance plan a very important distinction should be made between "cost" and "contribution rate." The *cost* of a plan, as we have already seen, is the sum total of claims paid, plus expenses, less any interest earnings. The *contribution rate,* on the other hand, is the premium amount which should be paid periodically (monthly, quarterly, etc.) to the insurance company to establish the reserve fund for claim liabilities. The rate is calculated on an actuarial basis and is estimated to be sufficient to meet future liabilities as they occur.

Each year the insurance company reviews the experience under the plan. If it has been favorable, *i.e.,* if there is a low incidence of claims paid out, it may return a dividend and reduce the contribution rate. If experience has been unfavorable, the contribution rate may have to be increased in order to maintain the plan on a sound basis.

Consequently, the contribution rate, or the "going in rate," as it is sometimes called, is not necessarily indicative of the true cost of the plan. Under the model association plan, for example, the net rate has been substantially less in recent years than the quoted "going in rate," as reflected by a 1957 dividend of 17 percent, a 1958 dividend of 10 percent, and a 1959 dividend of 20 percent.

## ACCIDENTAL DEATH AND DISMEMBERMENT INSURANCE

As the name of the coverage implies, this type of insurance pays benefits to the beneficiary of the employee if death is attributable to accidental means, and to the employee himself for loss of limbs or eyesight. Death benefit payments

| | Classification | | |
|---|---|---|---|
| Age Groups | Active Officers, Partners and Individual Proprietors | Dept. Heads, Superintendents, Foremen, Salesmen, Mgrs. and Salaried Supervisory Personnel | All Other Employees |
| **Life Insurance** | | | |
| Under age 65 | (A) $10,000 | (C) $5,000 | (E) $2,000 |
| Age 65 and over | (B) 5,000 | (D) 2,500 | (F) 1,000 |

**Accidental Death, Dismemberment Insurance**

| Age Groups | Active Officers, Partners and Individual Proprietors | Dept. Heads, Superintendents, Foremen, Salesmen, Mgrs. and Salaried Supervisory Personnel | All Other Employees |
|---|---|---|---|
| Under age 65 | (A) $10,000 | (C) $5,000 | (E) $2,000 |
| Age 65 and over | (B) 5,000 | (D) 2,500 | (F) 1,000 |

under this coverage are *in addition* to those payable under the life insurance portion of a group program. The schedule of benefits under the model association plan appears on p. 143.

The observations made earlier in respect to group life insurance would also apply to this coverage concerning amounts, classification, age, and cost and contribution rate. However, it is important to note that under the association plan this coverage is provided on a 24-hour basis and is not limited to "off the job" deaths or dismemberment claims. This 24-hour coverage feature is not automatically included in group insurance plans providing for accidental death and dismemberment benefits; and if you presently have a plan in effect, you may wish to check into it.

## HOSPITALIZATION AND MAJOR MEDICAL EXPENSE INSURANCE

Although it is, of course, possible for a company to set up a group insurance plan providing for payments only in cases involving death, accidental death and dismemberment, the majority of plans provide for hospitalization and surgical and medical expense benefits.

In considering the establishment of this type of coverage (or in evaluating existing forms of this coverage which you may now have) we must keep some basic concepts in mind:

1. Cover the basic liability but do not over insure.

2. Do not provide a schedule of benefits that will be too liberal or too stringent. Too liberal a schedule can have the effect of prolonging confinement or even inviting it, and too stringent a schedule may force an employee's return to the job before full recovery.

3. Seek a broad definition of dependent coverage as it relates to children, *i.e.,* the plan should provide for coverage of dependent children while they are continuing their education beyond high school. (Under many plans, dependent coverage expires for children upon their attaining 18 years of age, whereas our association plan provides coverage up to age 23.)

For purposes of illustration, let us apply these basic principles to the association Master Plan. In designing this plan, the three principal areas of expense normally encountered in most cases served as the framework:

| | | |
|---|---|---|
| Semi-private room and board (or $20 limit private room). All other covered hospital charges, emergency outpatient treatment, anesthesia, and local ambulance service. | Insurance pays first $500 | Insurance pays 80% of amount over $500 |
| | | Employee pays 20% of amount over $500 |

**Hospitalization Benefits** The plan provides unlimited semi-private coverage for the first $500 of hospital and allied charges, as noted. It also provides for a sharing of all other covered charges between the employee and the insurance company. This feature gives the employee a stake in the charges he is incurring and thus provides an element of cost control without imposing a heavy burden on the individual.

**Surgical Benefits** Included in this area are charges made by the assistant surgeon and for post-operative treatment.

There is no surgical schedule in the plan. Charges are covered as long as they are "necessary and reasonable" for the services performed. In this way, expensive brain surgery is covered to the same extent as minor surgery.

| | |
|---|---|
| Fees for surgeon regardless of where operation is performed | Insurance pays 80%; employee pay 20% |

**Medical Benefits** This is the category in which the major medical coverage demonstrates its flexibility. The medical expenses covered run the gamut from doctors' calls through laboratory and X-ray charges wherever incurred; private duty nurses; radium and X-ray therapy; blood and blood plasma; physiotherapy, medicines and drugs; and rental of iron lungs, hospital beds, and wheel chairs.

These services and supplies must be recommended and approved by a legally qualified physician, but no dollar limit or schedule limit is placed on them. Because of this feature the plan contains a deductible feature which screens out the small claims.

The deductible, $50, and applies to the above medical charges only and never to hospital or surgical charges. Once the deductible has been satisfied, all other charges are shared on the same basis as the hospital and surgical co-insurance—20 percent by the employee and 80 percent by the insurance firm.

| | | |
|---|---|---|
| Pays medical expenses for any one period of disability whether in or out of hospital | Employee pays first $50 per period of disability | Insurance pays 80% of costs over $50 per period of disability for each member of family; employee pays 20% |

In the event that more than one member of the family is injured in the same accident, only one deductible is charged rather than a separate one for each injured person. If an individual has two illnesses or injuries during the same period of disability, only one deductible is charged.

The deductible feature in the small claim area saves considerable administrative expense and makes it possible to provide the high maximum of $10,000 per individual at reasonable cost.

As mentioned above, a $10,000 maximum is applicable for each covered employee and his dependents. Thus, an employee with a wife and four children would be covered for the maximum of *$60,000*.

There are, of course, other worthwhile and attractive features of the association Master Plan, *e.g.*, disability waiver of premium, pregnancy benefits. The important consideration is that this association Master Plan is sound in design and application and meets the requirements established by the basic concepts in programs of this type.

In addition, member companies of the two associations stand to gain substantial cost savings in their group insurance coverages through participation in the plan as the result of pooling of mortality, and a lower administrative expense attributable to the over-all volume generated under it. Another good feature is the fact that the smaller producers, who would otherwise be denied the benefits of group coverage because of the number of employees which they have, may adopt the association program and share in the same cost savings available to the larger producers.

Nonmetallic minerals producers who, for one reason or another, would not be eligible to participate in the association-sponsored Master Plan, may, nevertheless, want to consider the advantages of establishing a group insurance program patterned after the Master Plan. In this way, they would not only be assured of a program based on sound, logical needs and requirements, but also one which would be geared to and in keeping with the needs and standards of the nonmetallic minerals producing industry. Such situations would have to be considered on an individual basis.

Interested producers may also want to consider the advantages of utilizing the services of a professional benefit plan consulting firm familiar with the needs of the industry, such as Donald Shepherd and Company, Inc., to perform the preliminary review and analysis work prerequisite to such action.


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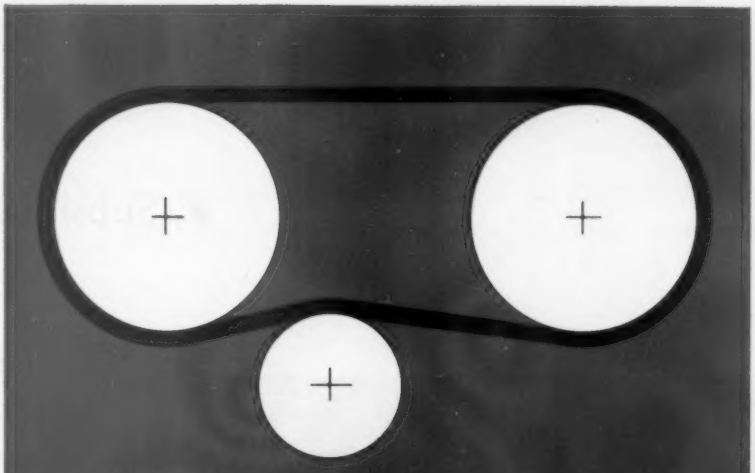

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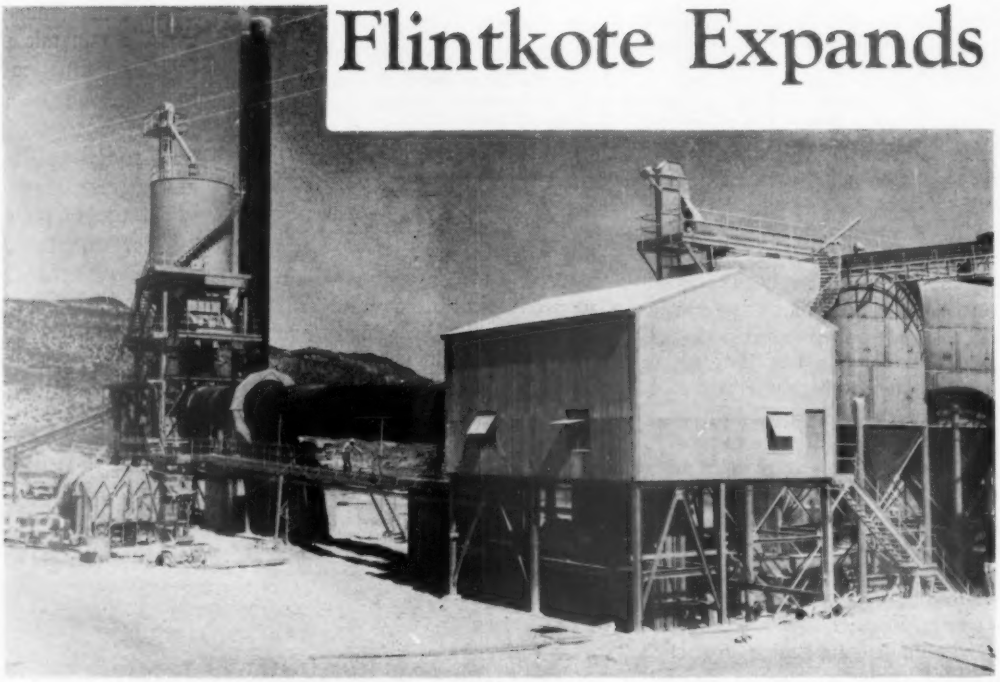
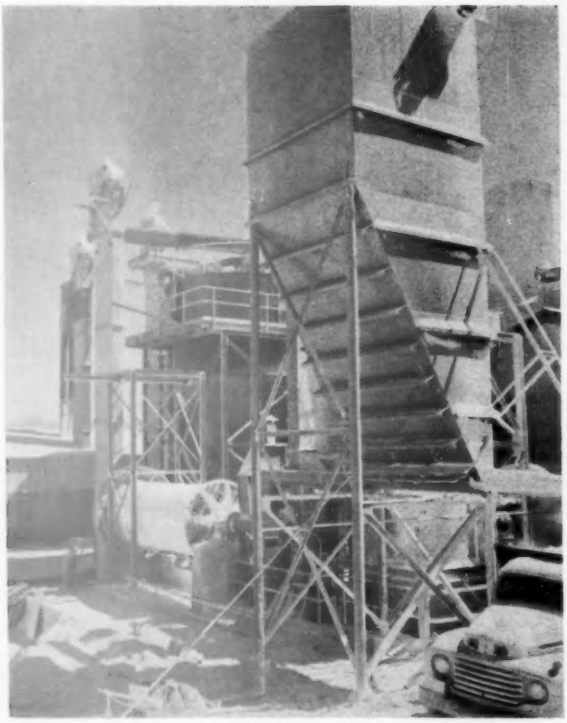
# Flintkote Expands



## • Subsidiary operation in Utah adds rotary kiln, pressure hydration



The new pressure-hydrating department has a 6- by 16-ft. tube mill, shown in this view, between the feed bin and an air-classifier.

ANOTHER ON THE SPOT report

ALREADY the largest lime producer in the West, the Flintkote Company this year took an even firmer hold on its leadership when it increased burning capacity and broadened its product range, this time in the Salt Lake City area which supplies the intermountain market.

Basically, the new facilities included the erection of a rotary kiln for calcining dolomite limestone, and a Corson-patented pressure-hydration plant to process the dolomitic quicklime into Miracle lime for the western construction trade. The expansion was carried out at the Dolomite, Utah, operations of Utah Lime & Stone Company, which Flintkote acquired about two years ago through an exchange of stock.

# Lime Holdings in West

Opposite page: The 9- by 140-ft. rotary kiln in which the dolomitic stone is calcined. The cylindrical tank above the preheater at the feed end is filled with kiln-feed stone; it has a capacity of 150 tons. The corrugated metal structure encloses the firing floor. Below is the cooler; and the storage bins for quicklime are at the right.

Utah Lime & Stone Company's new dolomitic-stone quarry, which is under development, supplies stone for burning in the new rotary kiln.

By HARRY F. UTLEY

The Dolomite plant is located about 45 miles west of Salt Lake City. The program involved a capital expenditure of about $1,500,000.

Utah Lime has been in existence since 1914. The dolomite deposit, at Dolomite, is supplemented by a high-calcium stone quarry at Flux, about 2 miles away. Both deposits lie in the Stansbury Range, convenient to the main line of the Western Pacific Railroad and cross-continental U.S. Highway No. 40.

By way of explanation, the high-calcium stone quarried at Flux is crushed and screened at that quarry. It is then trucked over to Dolomite for burning in a battery of five Ellernan calciners. Equipment used in the Flux crushing-and-screening plant includes two Allis-Chalmers gyratory crushers, a Pioneer jaw crusher, and Tyler Ty-Rock and Simplicity screens. Sized stone is also sold commercially.

In the expansion of the facilities at Dolomite, the old Ellernan vertical kilns (calciners) continue to be used to burn the high-calcium stone from the Flux quarry, and a new 9- by 140-ft. Kennedy-Van Saun rotary kiln was installed and placed in operation to burn the dolomitic stone, which is quarried nearby.

Years ago, dolomite lime was calcined in vertical kilns at Dolomite, and the new rotary kiln and pressure-hydrate facilities now give new impetus to this phase of the operations. A new quarry is being developed to provide the high-magnesian (44 percent $MgCO_3$) stone.

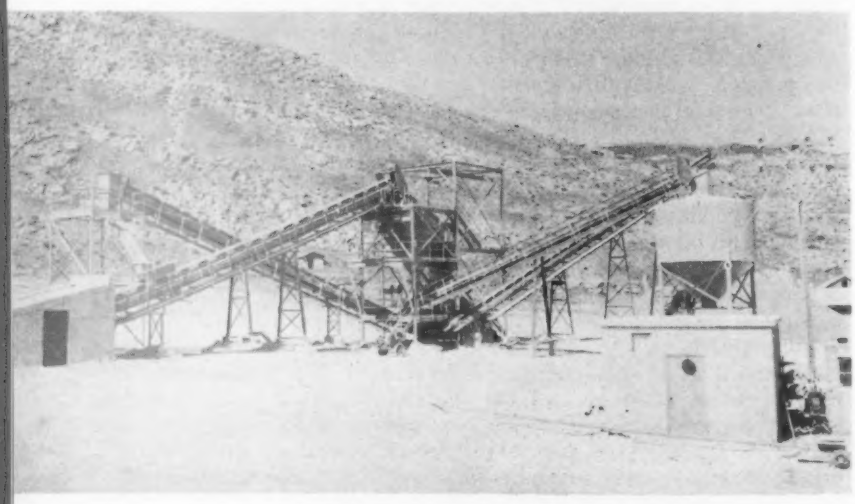
Currently, the new quarry is being operated as a single high-face working which eventually will be benched for convenience. Gardner-Denver AirTrac drills are used, and the holes loaded with Columbia-Geneva fertilizer-grade ammonium-nitrate prills. Three shovels—a 1½-cu. yd. Bucyrus-Erie, a 1-cu. yd. Bucyrus-Erie electric, and a 1½ cu. yd. P & H—are available for loading the blasted stone into Euclid and Ford end-dump trucks for the short haul to the receiving hopper at the plant.

The new dolomitic-stone circuit involving transport, crushing, screenings, burning, and pressure-hydrating, was laid out in a manner which roughly encircles the south perimeter of the old plant. It was designed by the engineering firm of F. C. Torkelson Company, Salt Lake City, and Flintkote engineering personnel. All the various belt-conveyors were supplied by Stephens-Adamson; Link-Belt furnished the bucket elevators; and about 20 separate screw-conveyors are of Jeffrey manufacture. (more)

A 42-in. Pioneer apron-feeder beneath the hopper transfers the stone to a 30- by 42-in. Pioneer jaw primary crusher. The crusher is set at about 5 in., and the product passes to a 30- by 220-ft. inclined belt-conveyor which builds up a primary surge pile of the minus-5-in. stone. The pile has a live-storage capacity of 1,000 tons. Feeder, primary crusher, and surge-pile conveyor have a 175 t.p.h. capacity.

The next phase of the new plant flow-sheet brings the dolomite down to kiln-feed size. A 24-in. Jeffrey reciprocating feeder reclaims from beneath the coarse stone pile, feeding the material to a 30-in. by 160-ft. belt conveyor running out the tunnel and up to a 5- by 12-ft. Ty-Rock double-deck screen. The latter takes out the plus ⅜- minus 1½-in. kiln-feed stone; it rejects oversize to a closed-circuited Kennedy No. 38 gyratory crusher, and discharges minus ⅜-in. fines to a 100-ton truck-loading bin. These fines compose a product which is sold commercially, being undesirable for kiln feed.

**Left: Quarry rock is brought down to minus 5-in. size, preparatory for further processing, in this primary jaw crusher.**



**Below: Stone is carried on the conveyor emerging from the head-house (left) to the screen and the secondary crusher, which prepare the kiln-feed material. The truck-loading bin (right) is for reject minus ⅜-in. fines.**

Kiln-feed stone is held in open storage, being lowered into a conical pile to minimize breakage while it is building up the pile, which has a capacity of 2,000 live tons.

Reclaiming from the pile and delivery to the 150-ton bin atop the feed-end tower structure at the kiln is by way of an 18-in. Jeffrey reciprocating feeder, a belt conveyor, a 3- by 8-ft. Overstrom cleanup screen, and a bucket elevator.

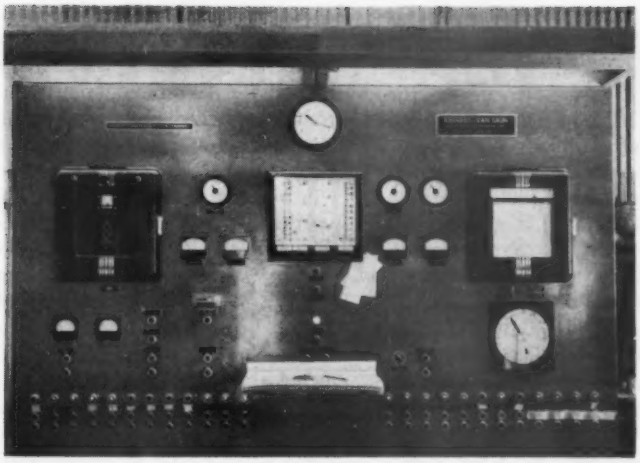
The cylindrical kiln-feed bin, which has a conical bottom, has a company-designed preheater section near the bottom. The kiln exit gases are taken off at the feed hood, circulated through the oncoming stone, and discharged *via* a cyclone dust-collector and induced-draft fan, and thence up a stack into the atmosphere. In pre-heating the stone, the exit gas temperature drops about 1,000 degrees before it is exhausted. Excellent fuel economy is thus obtained, especially since there is also relatively low radiation loss through the short kiln. With the preheater, fuel efficiency comparable to a kiln more than twice as long as the 140-ft. unit is reported.

Dust recovered from three sources—the cyclone collector, the dust chamber below the feed hood, and throughs from the previously-mentioned clean-up screen in the kiln-feed-stone circuit—are gathered by a screw conveyor and carried to a separate dust bin.

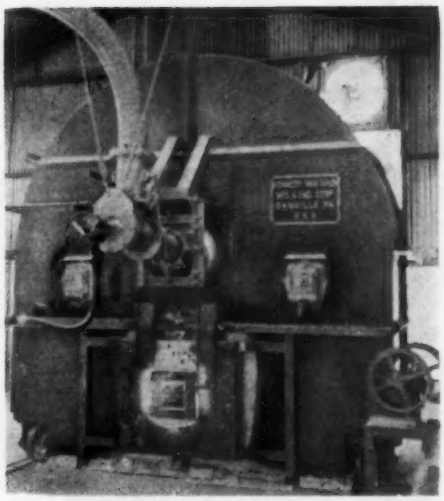
Kiln capacity is calculated at about 18 t.p.h. No. 6 Bunker C oil is used as fuel, the oil being preheated through piping coiled about the kiln near the discharge end. Instruments, supplied in large part by Leeds & Northrup, are mounted together on a Kennedy centralized control board on the burning floor. They include indicator-recorders for gas temperatures at critical points such as the burning zone, firing-hood draft, dust-chamber pressure, and secondary air flow. Cooler variables are also indicated.

The kiln is driven by a 40-hp. Louis Allis motor through Falk gears and couplings, with a Continental Red Seal gasoline engine in stand-by service. Normal kiln speed is 45 r.p.h.

Calcined lime is cooled with out-

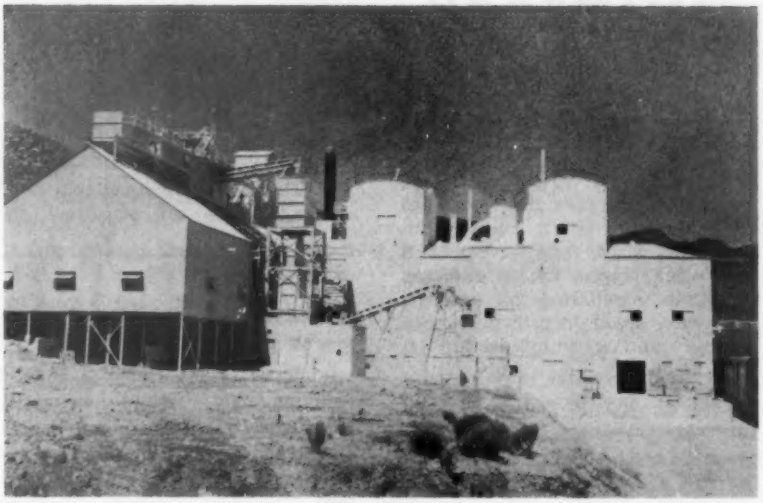


Above: Burning operations are regulated and observed at the centralized control board on the firing floor.



The firing hood on the oil-fired rotary kiln.

The old plant at Dolomite, Utah. The five Ellernan calciners are in the structure at the left. In the building at the right the pulverized quicklime and conventional hydrate are prepared, stored, and packaged.



side air in an insulated, conically-shaped contact cooler before it is elevated to the storage bins and distributed by screw conveyors. There are four 250-ton capacity bins, in the cluster, two for storage of pebble lime and two for crushed lime. All the pebble lime ultimately is ground in a hammermill prior to its entry into a surge bin which supplies the pressure-hydrating circuit.

The pressure-hydration system at Dolomite is the tenth of its kind installed so far, and the second such in the west; the first was made about ten years ago in the Henderson, Nev., lime plant of the U.S. Lime Products Co., now also a division of the Flintkote Co.

The process was conceived and developed by G. & W. H. Corson, Inc., Plymouth Meeting, Pa., a pioneer lime producer in the United States. Use of pressure hydration with its explosive discharge, followed by tube-milling, yields a most superior hydrate. In this process, the dolomitic lime is not only completely hydrated, but attains high plasticity instantaneously.

The resulting Miracle product is a finishing lime which surpasses by far in plasticity, soundness, and strength even the fabulous near-perfect limes of ancient Rome. The early Romans, however, placed their quicklimes in underground vats and left them to soak for many, many years. A century ago similar methods were still used in this country, although the impatient early American producer seldom slaked the lime for more than a year, usually considerably less. As the tempo of life and construction demand speeded up, the slaking period fell off until an overnight period became the rule. This did not improve the quality or the popularity of the lime, to say the least, among the building fraternity.

Early experiments of the Corsons in pressure hydration were carried on in the 1930's; and by 1943, a prototype of the present continuous pressure-hydration system was in successful operation. In 1948 a larger, improved hydrator was installed in the Corson plant, and the process was made available to the industry on a royalty basis.

In this, the most recent installation, the hammermilled quicklime is fed at constant weight from the surge feed bin at the Dolomite plant through the Corson system. The Miracle lime is then bagged by a

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Marketed by the Western Lime Division of Flintkote under the Boulder Canyon trade-name, the Miracle lime has important advantages not possessed by ordinary hydrate. Its plasticity index, by the Emley plasticimeter, is a great deal higher, above 500. Sand-carrying capacity is also much greater. Neither soaking nor aging is necessary since the high plasticity is attained immediately. This fact, probably more than any other, accounts for its widespread popularity in the construction trades.

In addition to the Utah operations, Flintkote has quarries and lime plants in Arizona, California, and Nevada which are operated as the U.S. Lime Products Division, with headquarters in Los Angeles.

The Arizona plant and quarries are at Nelson, in the northern part of the state. Output is confined to high-calcium products, and both quicklime and hydrate are turned out. Burning is done in a rotary kiln which replaced a row of old vertical kilns.

The California operation, at Sonora, is in the Mother Lode country. Both high-calcium and dolomitic stone are processed, the former being mined below ground, the latter coming from an open quarry. In addition to burned lime and hydrate, the production of finely-ground and sized glass-making flux is an important phase of the operation.

In Nevada, high-calcium stone is quarried at Arrolime, and dolomitic stone at Sloan. At the 4-rotary-kiln plant in Henderson dolomitic stone from the Sloan quarry is processed, and pressure-hydrated Miracle lime is made. The 2-rotary-kiln plant erected at Arrolime about two years ago ranks as one of the most modern in the industry. It was described by the writer in detail in the May, 1959, issue of PIT AND QUARRY.

In addition to its lime quarries and plants in the West, Flintkote also has lime-producing facilities in the eastern part of the United States and Canada. The Harry T. Campbell Division of Flintkote has a lime quarry and a plant at Texas, Md. Recently, Flintkote acquired the M. J. Grove Lime Co. of Maryland. This new division has quarries and plants at Frederick, Md., and at Middletown and Stephens City, Va. In Canada Flintkote's subsidiary, King Paving Co., Ltd., has a limestone quarry and a plant located at Mt. Nemo, Ont.

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**Contact Sulphuric Acid Plant Going Up in Florida**

Officials of American Cyanamid Company have awarded the contract for engineering and construction of a contact sulphuric acid plant at Brewster, Fla. Leonard Construction Company, Chicago, received the contract.

Elemental sulphur will be used as raw material. Construction will begin immediately, with a mid-1961 completion date scheduled. Capacity and cost of the plant were not announced.

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The National Safety Council, Chicago, has announced the appointment of CHARLES WOLFF as staff representative in the cement, quarry, and mineral aggregates section. Before joining the Council he was assistant to the managing director of the American Society of Safety Engineers. He also was editor of the Society's *Journal*. Prior to this Mr. Wolff was an insurance engineer with the Hartford Accident and Indemnity Company as an accident prevention specialist.

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W. M. CARNEY has been appointed vice-president and general manager of Western Aggregates of Everett (Wash.). The newly formed firm will manufacture and market sand, gravel, and crushed rock. For the last 14 years Mr. Carney has been vice-president and general sales manager of Cement Distributors, Incorporated, Seattle.

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DONALD T. WALKER has been named technical service engineer for Huron Portland Cement Company in its New York State Division headquarters at Syracuse, N. Y.

# The Lime-Silicate Plant

## Part II — Products and Process-Integration

By **WOLF G. BAUER**
Consulting Engineer

HAVING presented and discussed the somewhat provocative concept and product potential of the lime-silicate plant in Part I of this series, let us turn our attention now to the implementation and process-engineering aspects of this development.

**Product Grouping** Basically, we are dealing with the manufacture of three types of products. These comprise aggregates of several types, chemicals, and hydraulic cementing materials.

In Group I the aggregates may range from heavy crushed road and concrete types and those for masonry use—aggregates, sands, and fine powders processed from hard limestone and vitrified clay or shale clinker—to lightweight volcanic or synthetic glass and expanded clay and shale aggregates.

In Group II the products are manufactured and sold primarily for their value as chemicals, including chemical and metallurgical quicklime and hydrated lime, soil stabilization hydrate, and special sulphate and alkali-buffer pozzolans.

Group III products are various hydraulic cements, including hydraulic hydrated lime, natural cements, slag cements, pozzolan cements, and silicate cements.

Before taking up the process and plant design features which make the lime-silicate plant a technical and economic feasibility, it may be of interest at this point to briefly discuss some of the aspects of the process technology involved with the manufacture of Group III cementing material products.

Since the writer has treated some of the technical aspects of lime, lightweight aggregate, and pozzolan processing in some 75 articles during the last 18 years in PIT & QUARRY and other journals, these processing phases may be omitted in favor of a brief review of the problems and reactions associated with the manufacture of hydraulic cements in this type of plant operation.

### HYDRAULIC CEMENT PROCESSING FACTORS

Non-portland type cements have not played a major role in the construction market in the United States, but they are often rather widely used for various reasons and purposes in other countries. Since the lime-silicate plant can be said to have a rather broad geographical application with respect to the construction field throughout the world, production of cementing materials could represent a significant portion of sales for such an operation.

Even here in the United States such a plant can manufacture products meeting well-established and generally known A.S.T.M. specifications for such materials as Types A and B hydraulic hydrated lime (with or without pozzolan) as per C141-55; Types I and II masonry cements as specified in C91-58; Types N and NA natural cements per C10-54; and Types S and SA slag cement per C358-58.

The number, type, and quality of cementing materials that can be produced by any one lime-silicate plant will depend on the chemical and mineralogical composition of the lime, as well as the silicate materials available. It must be pointed out, however, that—unlike the manufacture of portland-type cements in which the raw materials are blended and adjusted on a chemical basis—product uniformity of these Group III cements must be achieved by virtue of maintaining primary uniformity in the original materials taken from the deposits; secondary dependency is on processing control, including regulation of set and strength through suitable activators and additives.

Although this elimination of direct chemical composition control is an inherent weakness and a problem in the manufacture of these various hydraulic cements, at the same time it represents a substantial process simplification, with consequent savings in manufacturing costs, as well as plant investment, compared to those associated with portland type cement production.

Although portland cements may vary as much as 30 percent in strength from various sources and regions, and sometimes slightly from shipment to shipment, this is nevertheless allowable as long as such fluctuations occur above a minimum-quality level upon which the user depends. This is equally true in the case of any other hydraulic cements. Some variations may occur as long as they do not affect minimum required values for each use or for each established regional specification.

In order to achieve a hydraulic cementing material that will hydrolyze to form a siliceous hardening-gel when wetted, we can approach the problem in two fundamental ways, with several variations of each. It is possible either to produce a proportioned mechanical mixture of lime and reactive soluble silicate-aluminate which upon wetting will combine chemically to form such hydratable cementing compounds, or the hydratable calcium silicates-aluminates may be first produced directly in the heating process. Whether purposely or by chance, both types of compounds may be present in some of these products.

The following discussion dealing with the potential hydraulic cement-making factors pertinent to a lime-silicate plant operation is not to be construed as implying that any source of lime and silicate will guarantee manufacturing success with any one or all of these cementing materials. It is, however, implied that available modern processing technology plus greater experience with the factors affecting and controlling silicate-aluminate reactivity and solubility rates do warrant a re-appraisal of the quality and types of hydraulic cements that can be more generally and specifically used and economically manufactured for the ever more diverse needs in today's construction fields.

**Hydraulic Hydrated Lime** This material is a mixture of calcium hydroxide plus water-reactive calcium silicates and aluminates. It is usually produced by relatively low-temperature calcination of an impure limestone, *i.e.*, one containing considerable silica and alumina. Thus a limestone analyzing about 80 percent $CaCO_3$, 14 percent $SiO_2$, and 6 percent $R_2O_3$ could, upon calcination and subsequent hydration produce a hydraulic lime within present A.S.T.M. requirements. Manufacturing hydraulic lime in this manner requires only a single primary raw material such as a suitable limestone. Some processing prerequisites may be listed.

1. Chemical and mineralogical uniformity of deposit or mined material.

2. Preferred presence of hydrous or amorphous forms of silica and silicates in finely dispersed form, rather than coarse crystalline anhydrous types.

3. Relatively long heat exposure time at optimum temperature for lime-silicate interaction without hard or dead-burning the uncombined lime. This also requires care in designing for a loosely-rolling porous bed of narrow particle-size range material in the kiln to prevent over and underheating some particles simultaneously within the bed.

4. Close calcining temperature control based on semi-continuous clinker tests.

5. Special two-stage hydration-separation system designed for maximum uncombined-lime hydration plus fine grinding of combined-lime fraction without pre-hydration of the water-reactive silicate components.

It can be seen that processing hydraulic lime is rather similar, in many of its aspects, to normal lime calcination and hydration, but that greater care and control along with some specialized techniques of processing are required in adapting an old art to modern technology, and an old product to higher present-day quality and performance standards.

Hydraulic hydrated lime can also be produced from limestone other than argillaceous or siliceous types. A mechanical mixture of purer hydrated lime with a reactive silicate could be employed in a ratio of 75 percent calcium hydroxide and 25 percent reactive silicate or pozzolan. Such a mixture requires two separate components processed individually prior to blending into a hydraulic lime. Material produced in this manner may be more costly to manufacture than that from a single raw material, but it is also free of the control problems connected with the prevention of residual unhydrated quicklime which is present in the former process. Such a blended hydraulic hydrated lime would probably be more accurately designated as pozzolanic lime hydrate.

Hydraulic hydrated limes have been used widely as plastic mortar cements, as well as in stuccos, autoclaved masonry products and concrete mixes; but they may also have a rather important application in modern soil cement and soil or road sub-base stabilization work, in which they can perform the dual function of providing basic ions as well as cementing-compacting material.

**Pozzolan Cements** With this type of cement product, the lime-silicate plant can capitalize on its ability to produce blends from two of its primary products, namely pozzolan and hydrated lime. A distinction here from the previously mentioned pozzolan lime hydrate is one of lime-to-silicate ratio, as well as product-use application.

Whereas the hydraulic hydrated lime is normally a lime product of high plasticity and moderately low cementing strength requirements, the pozzolan cement represents a reactive silicate-aluminate with only sufficient calcium hydroxide to satisfy the chemical combinations during hydraulic setting. This lime proportion is approximately in the reverse ratio of that in hydraulic lime.

In the case of the hydraulic lime, we produce some pre-combined hydratable calcium silicates and aluminates (non-pozzolanic), while in the pozzolan cement the lime is not yet combined until the mixing water furnishes the necessary solution phase for reaction. In this pozzolan cement today the same components are used as those employed by the ancients prior to the appearance of portland (fused) cement, about 150 years ago, except that we substitute modern techniques, controls, and beneficial additives for achieving higher-earlier strengths with reproducible quality.

Although the term "pozzolan cement" (not to be confused with "portland-pozzolan cement") is not being used in the United States at this time, it is nevertheless a logical term for any hydraulic non-portland type made up of these two major components; and it also fits into the use-category of general and special-purpose intermediate-strength hydraulic cements. Such pozzolan cements may span in application the currently used and specified hydraulic cements listed in Table 1.

When it is realized that some pozzolan cements can readily reach 7-day compressive strengths of twice the values shown here as minimum for slag cement in Table 1, with corresponding similar chemical re-

Table 1

| Designation | Gil. Needle Min. | Set Hrs. Max. | Cement-Sand Ratio | 7-Day P.S.I. Comp. | 28-Day P.S.I. Comp. | A.S.T.M. Designation |
|---|---|---|---|---|---|---|
| Hydr. Hydr. Lime ..... | 2 | 48 | 1:3 | 175 | 350 | C141-55 |
| Masonry Cement ..... | 2 | 24 | 1:3 | 500 | 900 | C 91-58 |
| Natural Cement ..... | ½ | 6 | 1:1 | 500 | 1000 | C 10-54 |
| Slag Cement ..... | ¾ | 24 | 1:2.75 | 600 | 1500 | C358-58 |

sistivity and soundness, it is understandable that such a product is widely applicable in the modern construction field.

The technique of manufacturing hydraulic cements by blending separately processed compounds of lime and silicates has certain control advantages over that in which hydraulic properties must be induced by less controllable "solid diffusion," as well as partial fusion of the calcium-alkali-iron-silica-alumina components, without recourse to chemical proportioning.

The simplest manufacturing condition for a pozzolan cement producer would be one whereby the pozzolanic component (such as fly ash, slag, volcanic glass, opaline silica, etc.) is already reactive without need for heat activation (except drying), and where the lime hydrate is purchased. In that case, only grinding, classifying, proportioning, plus any addition of catalysts or activators, is required.

More involved, of course, would be the case if pozzolanic properties first had to be heat-induced into the silicate component, and if the calcium hydroxide were obtained by calcination-hydration processes. Even so, heat processing operations of lime burning, pozzolan activating, and lime hydration are more or less straight-forward, once correctly process-designed.

Technical success in the manufacture of a pozzolan cement product is dependent on several factors. Of first importance is the availability of mineralogically and chemically uniform deposits of raw material, at least such as will lend themselves to selective mining for composition control, if necessary. Of further technical importance also is the margin of cement strength that can be achieved and maintained above the established or needed minimum requirements.

All other cement properties being equal, the range of present and future markets for pozzolan cement will be somewhat dependent on the early strength development obtainable with the particular product. This is not only a function of initial "built-in" pozzolanic reactivity of the silicate component, but also success in the achievement of optimum particle-size gradation and surface, as well as effectiveness of any accelerators or catalysts incorporated into the product.

Considerable investigational effort has gone and still is going into the study of how to speed up the pozzolanic reactions and the concurrent and subsequent hydrolysis reactions through the use of substances which will tend to hasten the hydraulic reactions, through their effect on the alumina and silica rate of solution, preferential adsorption and ionic interference or exchange, as added silicate-gel formers, as well as seeds and catalysts.

The alkalies of sodium and potassium have been widely investigated and used in this connection, not only because they are usually available in one form or other, but because with certain types of pozzolans they have performed with marked success. To the portland cement chemist, such "fooling around" with alkalies is probably like playing with fire, but it is this very solubility and reactivity with the silicate gels which the pozzolan cement technologist can put to practical use in some instances, so long as the reaction speeds hydrolysis and ends with insoluble alkali compounds.

We mention the alkalies here in this connection, since as early as 1895 U. S. Patent No. 544,706 was issued covering the use of sodium alkali for hastening the setting and hardening reaction with slag and slag-pozzolan cements. Since that time, and with the advent of better understanding of the mechanism responsible for portland cement concrete expansion due to alkalies with reactive silica, a great number of more or less successful investigations have been performed with the alkali-reactive group of pozzolans, pozzolan lime mixture cements, and the slower-setting low-time hydraulic cements in many parts of the world.

There are also many other substances which are rather effective in accelerating or controlling the rate of hardening of lime-silicate and aluminate cements, and also of pozzolan cements. One thing is certain —no one activator will equally effect the various hydraulic products discussed here. However, this is a subject which we hope to discuss later in connection with a more technical presentation than is required here.

**Silicate Cements** This type of cement may be of considerable significance to the centralized multipurpose lime-silicate plant, particularly if they are located in isolated regions. In those instances where clay or shale constitute the silicate raw material component, and where such material cannot be activated into a suitable pozzolan (from which a lime-pozzolan cement might be made) by heat activation, it is possible to produce a hydraulic cement similar in properties to those known as Roman cements in Europe, or natural cements on this continent.

The processing technique of this hydraulic cement has some similarity to portland cement manufacture, but is generally simpler and less costly. The pyro-processing phase is still accomplished in vertical shaft kilns in most instances. Product control is concerned with the same variables of raw material composition and reaction at elevated temperature mentioned earlier in the case of hydraulic lime manufacture. However, there is more leeway in both chemical and physical specifications than in the case of the portland type cements, and adequate early strength development is a major process design goal.

Due to the fact that natural "ce-

Table 2
Relative Percentages of Lime Compounds Formed with Kaolinite and Montmorillonite

| Temperature | Free CaO | | $C_2S$ | | $C_2AS$ | | $C_{12}A_7$ | | $C_3A$ | | $C_3S$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-Hrs. | Kaol. | Montm. | Kaol. | Montm. | Kaol. | Montm. | Kaol. | Montm. | Kaol. | Montm. | Kaol. | Montm. |
| 1652°F. | 35 | 40 | 12 | 20 | 28 | 25 | 10 | 8 | 0 | 0 | 0 | 0 |
| 2012°F. | 15 | 20 | 18 | 42 | 18 | 15 | 10 | 4 | 20 | 5 | 0 | 0 |
| 2372°F. | 4 | 1 | 20 | 30 | 0 | 0 | 0 | 0 | 60 | 22 | 9 | 35 |

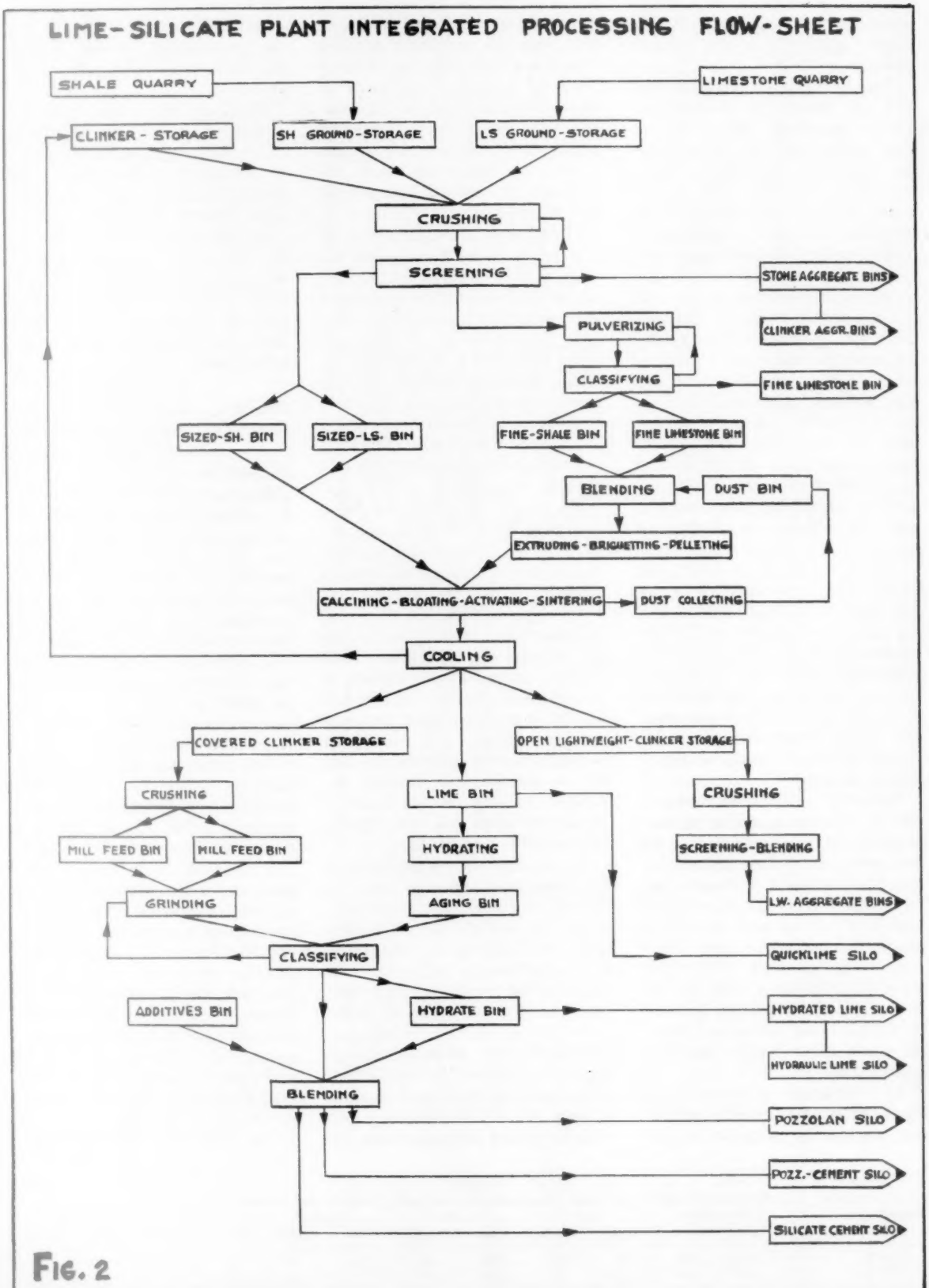

LIME-SILICATE PLANT INTEGRATED PROCESSING FLOW-SHEET
SHALE QUARRY
LIMESTONE QUARRY
CLINKER - STORAGE
SH GROUND-STORAGE
LS GROUND-STORAGE
CRUSHING
SCREENING
STONE AGGREGATE BINS
PULVERIZING
CLINKER AGGR. BINS
CLASSIFYING
FINE LIMESTONE BIN
SIZED-SH. BIN
SIZED-LS. BIN
FINE-SHALE BIN
FINE LIMESTONE BIN
BLENDING
DUST BIN
EXTRUDING - BRIQUETTING - PELLETING
CALCINING - BLOATING - ACTIVATING - SINTERING
DUST COLLECTING
COOLING
COVERED CLINKER STORAGE
OPEN LIGHTWEIGHT-CLINKER STORAGE
CRUSHING
LIME BIN
CRUSHING
MILL FEED BIN
MILL FEED BIN
HYDRATING
SCREENING-BLENDING
GRINDING
AGING BIN
LW. AGGREGATE BINS
CLASSIFYING
QUICKLIME SILO
ADDITIVES BIN
HYDRATE BIN
HYDRATED LIME SILO
HYDRAULIC LIME SILO
BLENDING
POZZOLAN SILO
POZZ.-CEMENT SILO
SILICATE CEMENT SILO

FIG. 2

ment rock" with a suitable hydraulic modulus is seldom available, a silicate cement can be produced from a proportioned blended mixture of such calcium and silicate components as limestone and clay, for example, provided that these occur in reasonably uniform composition as mined. The process requires size reduction of both materials (with or without drying); intimate mixing of both components; reforming by extruding, briquetting, or pelletizing; and subsequent firing to that minimum temperature above calcination which will facilitate chemical interaction of the lime-alumina-iron-alkali-silica minerals and glasses through both the solid diffusion and the partial glassy state.

For the more technically inclined reader, it may be pertinent and of interest, at this point, to present some findings of European investigators* in their examination of silicate-aluminate compounds formed during the relatively low reaction temperatures used in producing hydraulic lime. While it is true that the mixture used in this investigation consisted of 3 parts of limestone mixed with 1 part of clay minerals, a proportion characteristic of a hydraulic lime, it is nevertheless pertinent to the discussion of lime-silicate cements composed of similar components and heat-processed in the same non-fluxing temperature range.

Although it has been generally held that compounds formed at low temperatures are of the low-lime type, the investigations of both synthetic and naturally hydraulic limes here referred to showed formation of some high-lime compounds, such as are found in portland cement clinker. Table 2 is presented as a condensation and re-grouping of some of the data given in this German report.

Tests in this investigation have also shown that of the total available lime oxide in the original mixture after heating at the low temperature of 1652 deg. F., 47 percent was combined when heated with kaolinite, 36 percent when heated with illite, and 25 percent when heated with montmorillonite. Identification and presence of these compounds formed at such low temperatures and relatively short periods certainly tends to support the solid-state "diffusion reaction" mechanism by which hydraulic lime silicates and aluminates can be produced without resorting to fusion, fluxing, or melting.

The reader should take into account, of course, the fact that three hours' soaking at one temperature is not quite feasible for economical operation of a rotary kiln. It is, nevertheless, highly instructive to learn of the variations in reaction speed and amount obtained with the three chief clay minerals, and also to note the transient nature of $C_2AS$ and $C_{12}A_7$ above 2000 deg. F.

In applying these results to the silicate cement discussion in which the lime-to-silicate ratio is more nearly reversed from that used in the hydraulic lime mixture, we would expect very little free lime remaining above 2200 deg. F., which is, after all, only "hard-burning" heat in many lime kilns.

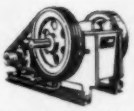
It may be mentioned here that an abstract of a Russian investigation pointed to greatly increased efficiency of lime-silicate interaction when quicklime, rather than limestone, was mixed with clay prior to calcination. This practice would, of course, very obviously be a matter of economics in each case. The results of the German investigation have been presented here simply as an illustration of how the variables of temperature and clay type may affect the cement quality limits in each prospective operation. (The time factor was not recounted for lack of space.)

Control over excess lime is vital and critical in silicate cement manufacture. In view of the fact that the burned clinker is not hydrated as in the case of hydraulic lime processing; that excess free lime is not dead-burned or absorbed in the liquid phase of eutectic melts and high temperature reactions as in portland clinker; and that it is impossible to disperse the lime as intimately with the silicate minerals, as might be the case in natural cement rocks—excess uncombined lime oxide must be particularly

(*Concluded on page* 196.)

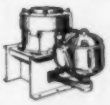
*From an article on *The Constitution and Hardening of Hydraulic Lime*, by Ludwig, Muller-Hesse, and Schwiete; October, 1960, issue of *Zement-Kalk-Gips*.


# Laboratory Crushers and Pulverizers



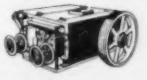
**4"x 6" Massco Laboratory Jaw Crusher**

Welded steel frame; manganese steel jaw and cheek plates; bronze bushed bearings; smooth jaws give better product and easier cleaning. Adjust for plate wear and product size by convenient hand wheel adjustment.



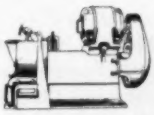
**6" and 10" Massco Gy-Roll Reduction Crusher**

Reduces ½" feed to as fine as 10 mesh in single pass. High capacity, low power consumption.



**Laboratory Crushing Rolls**

Sizes (Diameter x width): 8"x 4", 10"x 6", 10"x 8", 12"x 10" and 12" x 12". Adjustable roll space setting up to ¾". Double V-belt drive. Heavy, cast Meehanite frame absorbs vibration, results in long life.



**Massco-McCool Pulverizers**

Disc type grinder with a planetery movement. No gears. Will grind ¼" to 150 mesh in one pass.

**Marcy Pulp Density Scale**

Gives direct reading of weight; specific gravity of liquids, pulps, and dry solids; percent solids in pulp. Very accurate. Easy to clean.

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OFFICES AND AGENTS IN PRINCIPAL CITIES

Enter 155 on card, page 183

# 43rd Annual N.S.A. Meeting

## Slag Producers Focus On Shipment Continuity, Product Spectrum

By BUREN C. HEROD

Following election of new officers, the retiring president, Charles W. Ireland (Vulcan Materials Co.), center, passed the gavel to the new N.S.A. president, Edward C. Levy (Edward C. Levy Co.). At the right is George W. Lanier (Houston Slag Materials Co.), who was elected vice-president; and W. S. Shaw, who was re-elected treasurer. At left is the N.S.A.'s managing director, E. W. Bauman.

AN air of confidence prevailed during the 43rd anual meeting of the ual meeting of the National Slag Association. In their sessions at the Mayflower Hotel, Washington, D. C., on November 3 and 4, the members calmly appraised the admittedly difficult problems with which they are faced. However, the analytical discussions and exchange of ideas in this meeting indicated unabated vigor in attacking the industry's common difficulties.

As pointed out by N.S.A. president, Charles W. Ireland (Vulcan Materials Company), in his welcoming address, the slag producers face a highly competitive aggregate market, one that requires all the talents and skill of experience to hold a favorable position. While the effort required is considerable, the benefits are commensurate.

A series of area reports presented by directors from various parts of the country highlighted the similarity of experience of most members. The similarities extended to availability of raw material, markets, output, and future prospects.

Significantly, most reports indicated steady optimism. In spots, sales were down somewhat this year, but in general the feeling was that they would nearly equal those of the preceding year, and that the over-all industry should hold steady during 1961. An almost universal primary problem was that of raw material availability. In some instances, the market exceeded the supply. Although this situation poses difficulties in the competitive markets, the producers hold steadfastly to concentration on production of quality material.

In a broad review of the industry, it was noted that continuity of shipment is a particular problem for expanded slag sales. Concrete masonry and products have suffered, and this market represents about 95 percent of expanded slag consumption. Every effort should be expended to improve this situation since expanded slag was described as having an advantage over other lightweight materials in many ways, and therefore the advantage should be maintained.

A general summation by Mr. Ireland emphasized the point that growth of slag aggregate sales stem from customer service. In view of the fact that these materials enjoy growing popularity, the industry should capitalize on its promising potential by intensifying promotion of quality and customer service.

**Managing Director's Report** The basic association program followed a pattern similar to that of previous years, according to E. W. Bauman, managing director of N.S.A. It was directed primarily to these activities: research, engineering, consultation, information distribution, publications, ad-

At the head table during the annual banquet were (l. to r.): George W. Lanier; Edward C. Levy; E. C. Bauman; H. T. McIlwain, master of ceremonies; Nello L. Teer Jr., featured speaker and president, A.R.B.A.; Charles W. Ireland; Fred Hubbard; and Stewart Steffey.

vertising, compilation of industry statistics, and safety.

In the area of research, negotiations were completed for a contract with Pennsylvania State University covering a 12-month research project to study *The Relationship between Texture, Behavior, and Usability of Slag*. Another important project concerns current investigations being conducted co-operatively by the N.S.A. laboratory and Bethlehem Steel Company on the problem of autoclave corrosion. The latest findings, it was noted, would indicate that the trouble may be due more to the presence of oxygen in the curing cylinder than to sulphur compounds in the aggregates.

With respect to engineering service. Mr. Bauman cited the work of the association's chief engineer, and his widespread recognition by associates in allied industries and on technical committees. The association is in a better position than at any other time in its history to give effective engineering assistance, Mr. Bauman said.

In addition to N.S.A. committee work, the association's staff has actively participated in programs of several outside industry and technical groups. These include representation on committees of the A.C.I., A.S.T.M., A.R.E.A., the American Public Works Association, and the Highway Research Board.

The managing director emphasized that the favorable position now enjoyed by slag in national specifications is due in large part to the time and effort spent in co-operation with these groups in the development of specifications and test methods; and that continued active participation is important in maintaining that position.

With respect to publications and technical releases, Mr. Bauman indicated that the policy of issuing N.S.A. Master File Releases concerning important developments or special uses of blast furnace slag has been continued at the same high level as previously. In addition, there were a number of circular letters keeping members informed on important association developments.

In summing up the over-all association program, Mr. Bauman noted that N.S.A. was in as strong a position in all phases of its service, as at any time in its history.

**Engineer's Report** A summary of the many and varied activities carried out by his office was presented by D. W. Lewis, N.S.A. chief engineer. In addition to the sessions of the association's technical committee, Mr. Lewis listed a number of important research projects which have been completed and others which are current or are in the planning stage, to be undertaken in the near future.

Among these studies are investigations of chemical, petrographic, and physical properties of slag, now under way at Penn State University; resistance of slag to freezing and thawing (data to be released soon in an N.S.A. Master File); slag block characteristics (already reported); high-strength slag concrete (final report to be issued soon); alkalinity and acidity tests of slag and water solutions, a study which is virtually completed; autoclave corrosion, in which preliminary results are being put to further check; and iron in slag aggregate, which is now in the earliest stages. The latter will develop into one of the more important research projects of the coming year, Mr. Lewis indicated.

Work with a number of national technical societies, federal and other agencies, and industry groups continues as an important phase of the chief engineer's program. Varied miscellaneous activities have included field inspections of slag applications, a study of sound transmission through concrete masonry walls, and development of mix designs for expanded slag concretes.

In summation, Mr. Lewis indicated that plans are being laid for increasing service to N.S.A. members by expanding the reporting of the chief engineer both in quantity and in detail. This is being done to provide the industry producers with more detailed information on items that might be of interest to them, and to make it available more promptly.

**New Officers** Following the recommendations of the nominating committee, the group elected the following men to the association's top offices: Edward C. Levy, president; George Lanier, vice-president; and W. S. Shaw, re-

Fred Hubbard, facing the camera, receiving from George W. Lanier the first N.S.A. Award of Merit in recognition of his 35 years of service to the organization. Excerpts from the citation make a fitting caption, i.e., "Whereas: Few men in passing through this life are specially blessed with the rare gift of selfless service to their fellow men, and we are indeed fortunate to have such a man in our own beloved Fred Hubbard . . . . now, therefore, be it resolved that we, the directors and officers of N.S.A. do acknowledge these many contributions and hereby extend to him our everlasting thanks for his genuine friendship, for his many services patiently extended at all times to all members, for his exemplary life as a Christian gentleman . . . and proudly present the association's first Award of Merit.

elected treasurer. C. W. Ireland, retiring president, replaces C. A. Barinowski as one of the four members-at-large on the executive committee.

Three new directors were also named. The nomination of Robert Merring was approved, to fill the vacancy caused by the retirement of L. E. McDermut. John Betts was elected to the board to fill the vacancy caused by the retirement of C. E. Fell; and the third director named was R. Hayes.

The board of directors also acted on a recommendation of the Research and Product Development Committee occasioned by the retirement of Fred Hubbard, N.S.A.'s director of research and chairman of its technical committee. It was recommended that the two posts now be separate—the chairmanship of the technical committee to be undertaken by H. Williams, and the duties of research director to be handled by the chief engineer.

Mr. Hubbard's long and distinguished service to the association and the industry was recognized as a highlight of the meeting, and he was presented with an impressive Award of Merit.

**Program Speakers** At a luncheon meeting and during the annual banquet, the producers heard two effective speakers—one from within their own group, and the other a top officer in an allied organization.

Stewart H. Steffey (manager, slag products, U. S. Steel Corporation) penetratingly reviewed the background, present, and future of the slag industry. The record established by the industry's founders is enviable, and on this strong basis further records can be built, Mr. Steffey emphasized. However, progress will not lack problems.

Among the latter will be potential product changes due to new ores, improved raw material preparation, and different fuels. Chemistry changes resulting from the foregoing could increase abrasion resistance, reduce acceptability for cement, alter weight, and affect expandability. The possibility of a decrease in slag volume—due largely to the same factors that could effect chemistry changes—will probably be offset by technological changes in production of molten iron which have increased the capacity for producing molten iron although less slag is delivered per ton of hot metal.

The opinion was expressed that total slag tonnage available during the next five years will, on the basis of the above consideration, be equivalent to that available during the last five years. Further, the marketing job being done by the steel industry in new product areas assures ample slag for years to come, it was noted.

Recognition of slag as a versatile, adaptable material with many outstanding advantages was proposed as the best solution to greater competition. A new spectrum of improved uses from blast furnace slag and products was suggested in the areas of aggregates, cast shapes, abrasives, insulation, glass and ceramics, and agriculture.

Proper utilization of prepared open-hearth slag must follow the higher-grade uses of blast-furnace material, the speaker said, so that any gap can be closed. Suggested areas of controlled usage included aggregates, blasting grit, and agriculture.

In substance, Mr. Steffey pointed out, the key to future growth is to be found in new products and selected, upgraded uses for present products. This growth is dependent upon the establishment of a vigorous product development and research program. Such a program, financially supported by association members, would constitute a charge and a challenge for the present generation of slag producers in building on the impressive record of their predecessors.

In his address at the annual banquet, Nello L. Teer Jr., president, A.R.B.A., and president of the Nello L. Teer Company, presented an unusual equation relating to the highway program. Such a "highway equation" must be defined in terms of people, Mr. Teer stated; therefore, in

$$X = E + \left( \frac{C_1 + M + Q^2}{B} \right)$$

X represents the project, E the engineers, C the contractors, M the materialmen, Q the equipment manufacturers, and B the underwriting bankers.

Thus showing the close relationship of the many groups directly involved in road building, Mr. Teer declared, "Highways are catalysts of economic growth." Stimulation of this growth involves three factors—also expressed in human terms—affecting the equation. These factors include the interest and support of political leaders, scientific support, and public support.

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MEL J. LONDON, vice-president of Calaveras Cement Company, a Division of the Flintkote Company, has been named by Governor Edmund G. Brown to a 21-member citizens committee to promote California's State Fair.

# *How Does* Staying on the Job *Affect* Social Security Benefits?

● A release of general interest, prepared by the Social Security Administration, United States Department of Health, Education, and Welfare

YOU do not have to retire completely to draw social security benefits; and under recent changes in the social security law, many social security beneficiaries who work in 1961 and later years will have less of their benefits withheld than they do now.

As before, however, a person is considered retired if he or she is not earning more than $1,200 per year. A beneficiary who earns more than $1,200 loses only $1 of benefits for every $2 that he earns between $1,200 and $1,500. For every $1 of earnings above $1,500, he loses $1 of his benefits.

Under the rules in effect before 1961, a beneficiary who earned over $1,200 in a year could lose a whole month's benefit check for $80, or the fraction of $80 by which his earnings exceeded $1,200. So, if his earnings were over $2,080, he could lose all benefit checks for the year.

However, under both the old and the new rules, a beneficiary can be paid his full benefit check for any month in which he neither works for wages of more than $100 nor renders substantial services in self-employment. It does not matter how high his total earnings for the year may go, he will still be paid his checks for those months.

If you are a man age 65, or older, or a woman, age 62 or over, and are still working part time, you may be entitled to social security benefits for some of the months in the calendar year. If you are already getting social security benefits, you will get full information through the mail about the new rules, so that you may plan for the work you may want to do in 1961.

If you are past retirement age, but have not yet applied for your social security benefits because your earnings are too high, get in touch with your social security office now. The new rules that go into effect in 1961 may make it possible for you to collect some benefits although you are working.

The following questions and answers are illustrative and informative on several changes in the social security law.

## MAJOR CHANGES—1960 SOCIAL SECURITY AMENDMENTS

**QUESTION** What were the major changes in the 1960 Amendments in the old-age, survivors, and disability provisions of the Social Security Act?

**ANSWER** (1) Disability benefits can now be paid at any age.

(2) The amount of social security credit required to get benefits was reduced about one-third.

(3) Most beneficiaries can earn more after 1960 and still get some benefits.

(4) Survivors of insured workers who died before January 1, 1940, and after March 31, 1938, may now receive monthly benefits.

(5) Some children of deceased parents will have their benefit amounts raised.

(6) Dependent widowers of women who died before September, 1950, may now get benefits.

(7) Parents who work for sons or daughters (except household or non-business work) may get social security credits beginning in 1961.

(8) Clergymen who failed to file waiver for social security credits may do so any time before April 15, 1962.

**QUESTION** What does the removal of the age 50 requirement for disability benefits mean?

**ANSWER** It means that a disabled person who has 5 years of social security credits out of the 10 years before becoming disabled may be paid his social security benefits, regardless of his age. His minor children and qualified wife may also be paid benefits based on his earnings record.

**QUESTION** I had my social security record frozen under the old disability freeze provisions. What should I do now?
**ANSWER** If you have not received a letter from your social security office asking you to file your new claim for monthly benefits, contact that office for information about applying for cash benefits.

**QUESTION** When did disability benefits for people under 50 begin?
**ANSWER** The first checks were for November, 1960.

**QUESTION** What change was made in the amount a social security beneficiary may earn, and keep all his social security checks for a year?
**ANSWER** A person earning over $1,200 per year will still have some deductions made from his benefits. However, instead of making the deductions by holding up entire checks for one to 12 months of the year, $1 will be held out for each $2 of earnings between $1,200 and $1,500 in the year, and $1 for each $1 of earnings over $1,500. For example, if a husband and wife are getting $150 per month, they will still get at least $650 in benefits even if the husband earns $2,500 in the year.

For full details as to how much you may earn and still get some benefits, write your social security district office. All beneficiaries will still get a full month's benefits for any month in which earnings are less than $100, no matter how high the annual total.

**QUESTION** How was the required time to become insured shortened?
**ANSWER** Before, you needed social security credits for a period equal to one-half the time after 1950 (or age 21, if later) and before retirement age (62 for women, 65 for men) or death. Now, you need have credit for only one-quarter of work under social security for each three calendar quarters between 1950 (or the year you reached age 21) and the year in which you reach retirement age or die.

If you reach retirement age before 1957, you need only six credits (1½ years) to be fully insured. You will need 2¼ years of credit if you reached retirement age in 1958; 2½ if in 1959; 3 if in 1960; 3¼ if in 1961, etc.

**QUESTION** My claim was turned down last year because I had credit for only 11 of the needed 17 quarters. Can I now collect my social security?
**ANSWER** Yes. You should apply again as soon as convenient for you to contact your social security office, or a representative of that office when he is in your community.

**QUESTION** My husband died in 1939. He was covered by social security, but I was told that year and several times later that I could not collect on his social security when I am 62. Has that been changed?
**ANSWER** Yes. Survivors of workers who died after March 31, 1938, and before January 1, 1940, can now be paid the same as survivors of workers who died after 1939. A widow who is 62, who has not remarried, and who has not built up a higher payment by her own work, can collect monthly benefits.

Adult children who have been disabled since before their 18th birthday may now be paid monthly benefits based on the record of a parent who died after March 31, 1938. The same is true for dependent parents of such deceased persons. Of course, the deceased person must have had credit for at least 1½ years of work under social security.

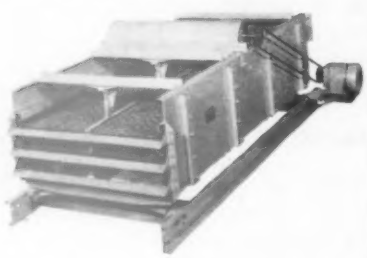
**QUESTION** My minor child was not eligible for benefits when his real father died because he was living with and being supported by his stepfather, my present husband. Do the 1960 amendments change that in any way?
**ANSWER** Yes. A child can now always be paid on his natural father's earnings record, even though living with and supported by a stepfather.

**QUESTION** My father works in my store (or on my farm). When do I start reporting his wages for social security credits?
**ANSWER** Your first report will be filed in April, 1961, covering the first three months of 1961, and then each following calendar quarter will be reported in the first month following such quarter. However, for work on a farm, reports are made annually rather than quarterly, the first report to be made in January, 1962, for the full year of 1961.

**QUESTION** I work for a nonprofit organization (or a church). How can I now get social security coverage and credits?
**ANSWER** The old requirement that two-thirds of the employees must agree to coverage has been repealed. Now, one employee may get such coverage if the governing board or body agrees to such coverage. Once the organization files a waiver to cover one or more employees, all persons hired after that date are covered on a compulsory basis.

**QUESTION** I have read the questions in this series, but didn't find the question I'd like answered. How can I get the information I want?
**ANSWER** Contact your local social security office, or see their representative when he is in your area.


**UNIVERSAL**



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*Report from Bishop Sand and Gravel Co.—Mitchellville, Iowa*

# "OUR NEW 977H IS DOING A BETTER AND FASTER JOB THAN ANY OTHER MACHINE WE COULD HAVE USED...

**"One of the reasons we get such good production is the power shift transmission. I think it's one of the best improvements ever put on a machine."**
**I. J. Bishop, Owner**

The Bishop Company produces 1000 tons of sand and gravel a day. Their 977H excavates the gravel, feeds the screening plant and loads trucks. Occasionally, it's used for building levees, stripping overburden and general utility jobs.

This new 977H Traxcavator is a 2½ yd., 150 HP, tough, reliable machine that can handle about any excavation-loading job that comes along. It's designed to set a faster production pace than the model it replaces (and other makes of comparable size). With power shift transmission and live action hydraulics, it's the Traxcavator that never stops. It can take the roughest kind of work in stone quarries and gravel pits—move as much as 3 to 4 thousand tons a day.

Also built for tough pit and quarry work is the 955H—a 100 HP machine with 1¾ cu. yd. bucket and the same advanced features as the larger 977H.

Why not call your Caterpillar Dealer and arrange a demonstration? Put these machines against those you are now using and watch the difference.

**NEW POWER SHIFT TRANSMISSION**—one lever gives split-second changes in speed or direction to slash cycle time.

**NEW LIVE ACTION HYDRAULICS** provide faster lifting speed and greater lifting capacity without robbing power from tracks. The 977H packs 41% more hydraulic lifting force—955H, 37% more than former models.

**NEW HEAVY-DUTY UNDERCARRIAGE** has big D7 size track components, triple grouser shoes, lifetime lubricated rollers that need no servicing until rebuilding. Track guiding guards are welded to the roller frame for positive track alignment.

**NEW DRY-TYPE AIR CLEANER** removes 99.8% of all dirt from intake air even in worst dust conditions—cuts maintenance time as much as 75%.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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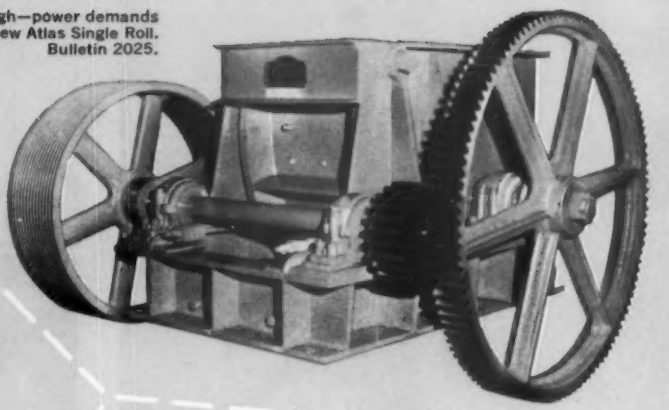
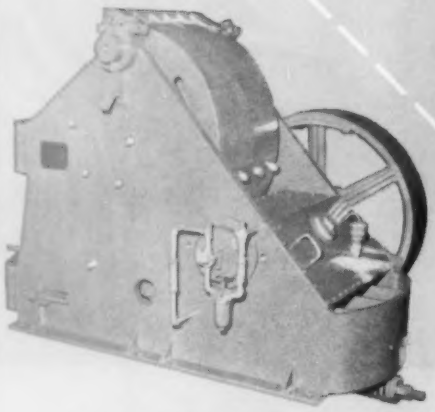
**TRAXCAVATORS ARE MAKING OTHER LOADERS OBSOLETE**

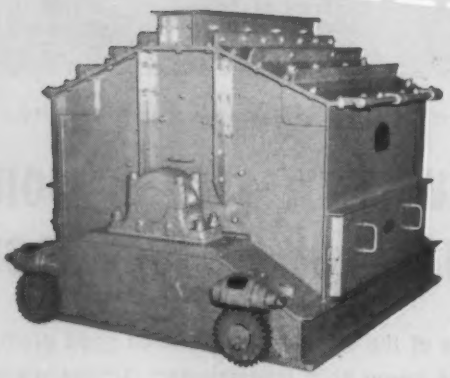
Reduction ratios are high—power demands low—with the new Atlas Single Roll. Bulletin 2025.





Kue-Ken Jaw Crusher uses the famous "crushing without rubbing" principle of operation. Send for Bulletin 5015.

Pennsylvania Reversible Stone Hammermill features 2-zone crushing, high production, low maintenance. Bulletin 1034.



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PENNSYLVANIA CRUSHERS

BATH-BUILT

# power factor correction

By H. A. JONES*
British Insulated Callender's Cables Ltd.

## PART I

THE efficient operation of plants in quarries is a matter which engages the attention of both management and engineering personnel, as all steps taken to reduce operating costs are of such vital importance.

In this paper it is intended to deal with the question of power factor correction of electrical loads, and to outline the general principles to be observed in formulating an entirely suitable scheme to meet the particular requirements of individual quarries.

Power factor correction may permit one or more of the following economies to be realized in quarries:

1. Reduction in Area Board electricity accounts.
2. Decrease in both loading and losses in cables, transformers, and switchgear, or conversely to increase the available load-carrying capacity of such equipment, thus permitting additional load to be carried by existing equipment.
3. Reduced voltage drop, with its attendant operating difficulties.
4. Increase in available load capacity of generating plant installed.

In this country (England) almost all Area Boards formulate their industrial tariffs to encourage consumers to operate at relatively high power factors, and hence the question of ensuring that this matter is investigated is a necessity.

### Importance of Power Factor

Before embarking on the methods to be adopted to combat low power factor, it may be advisable to consider what power factor really is and why it is so important.

The current taken by most forms of alternating current electrical equipment can be regarded as being made up of two parts. One is a power-producing current which is converted into useful work; the other serves only to energize the magnetic circuit of the machine. It is generally referred to as magnetizing current. *Power factor is merely the proportion of the power-producing current to the total of the power-producing and magnetizing current.*

The magnetizing current, which is in effect an evil necessity, burdens generating equipment, transmission and distribution systems, transformers, and switchgear in the same manner as power-producing current, this being the reason for the Area Boards giving financial inducements to consumers whose requirements of magnetizing current are low.

Unfortunately, the arithmetical sum of the power and magnetizing currents do not give the total current. The two currents have to be added vectorially, due to the fact that while the power current is in phase with the voltage—both reaching zero, maximum positive and maximum negative peaks at the same instant—the magnetizing current lags behind the voltage by 90 degrees.

As an analogy, consider a tube of shaving cream. Pressure has to be exerted on the tube before the contents exude. In other words, there is no "flow" until pressure is exerted, or in an analogous manner—the flow (current) lags the pressure (voltage). Similarly, the magnetic part of a circuit resists the flow of current through it; so one has to associate in one's mind that

*This paper was presented to the Institute of Quarrying at the Fourth Short Course in Quarry Practice at Ashorne Hill, near Leamington, England.

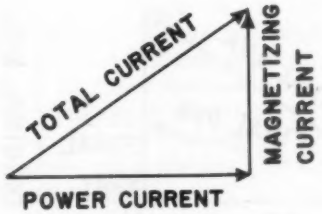

Figure 1

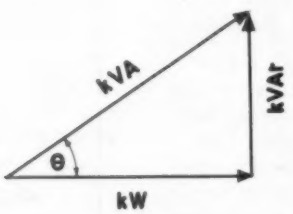

Figure 2

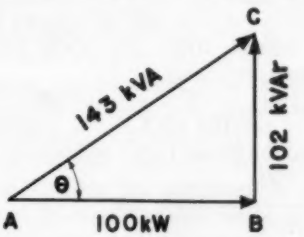

Figure 3

in a magnetic circuit the current lags the voltage.

The vector diagram of total, power, and magnetizing currents is shown in Figure 1.

As power is the product of current and voltage, this diagram can be extended to show the relationship of apparent power (kVA), real power (kW) and reactive component (kVAr), as in Figure 2.

As power factor is the ratio of real power to total apparent power, we have:

$$\text{Power factor} = \frac{\text{kW}}{\text{kVA}} = \text{Cos } \theta$$

It will be appreciated that if the reactive component (kVAr) can be reduced in any way, and the true power (kW) remains the same, the apparent power will be reduced.

For example, if the vector diagram is drawn for a load of 100 kW at 0.7 power factor, we have:

$$\text{kVA} = \frac{\text{kW}}{\text{Cos } \theta} = \frac{100}{0.7} = 143$$

and $\text{kVAr} = \sqrt{143^2 - 100^2} = 102$

This is shown in Figure 3, where AB represents the kW, BC the kVAr, and AC the kVA.

The angle between the kW and kVA vectors is generally known as $\theta$, and the power factor $\left\{ \frac{\text{kW}}{\text{kVA}} \right\}$ naturally as Cos $\theta$.

To improve the power factor of the above circuit, the length of the kVAr vector has to be reduced, and this is conveniently done by means of a capacitor.

It was previously shown that when voltage is applied to a magnetic circuit the current lags behind the voltage. However, when voltage is applied to a capacitor, exactly opposite conditions apply, the current leading the voltage by 90 degrees. Referring to Figure 1, it will be noted that the magnetizing current is at right angles to the power current, lagging behind it by 90 degrees. Now if a suitable capacitor is introduced into the circuit, the revised circuit conditions can be represented as in Figure 4.

It will be seen that the capacitor current is exactly opposite in effect to the magnetizing current, and in effect it neutralizes a portion or all of the original magnetizing current, depending on the extent of the capacitor current. The resulting conditions are then as shown in Figure 5, from which it will be seen that although the power current has remained unaltered, the total or apparent current has been considerably reduced, and the power factor (Cos $\theta$) has been improved.

If the conditions shown in Figure 3 are considered with a capacitor of 72 kVAr connected into the circuit, the kVAr of 102 will be reduced to 30, while the kW will remain 100. The kVA load will therefore be reduced to

$$\sqrt{100^2 + 30^2} = \sqrt{10900}$$

*i.e.* 104 kVA

—and the power factor will be—

$$\frac{100}{104} = 0.96 \text{ Lag}$$

It will be readily appreciated that if the capacitor and magnetizing currents were equal, there would be

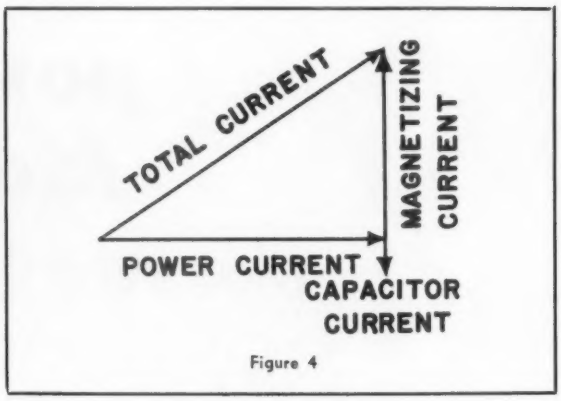

Figure 4

no resultant magnetizing current, and the kW and kVA vectors would coincide. This condition is known as unity power factor, *i.e.* $\frac{\text{kW}}{\text{kVA}} = 1.0$.

Equipment in which there is no magnetic circuit, such as filament lighting and most forms of resistance heating, consumes no magnetizing current. Thus the current taken is wholly power current, and the load operates at unity power factor.

On the other hand, the universally used induction motor, welders, and transformers all consume magnetizing current, and therefore operate at power factors below unity.

The above shows why a capacitor is often looked upon as a magnetizing current generator; and if such generators can be placed adjacent to the point where magnetizing current is consumed, the system loading is reduced to a minimum.

### Methods of Power Factor Improvement

As the power factor of a motor falls with the decreasing load, it is always advisable for the horsepower to be closely related to the starting and peak load conditions. Too often it is found that motors are larger than is required by the load they have to carry. Reselection of motors and possible rearrangement of drives are therefore the first aspects to be considered in relation to power factor, and it is often possible in this manner to effect improvements in the inherent

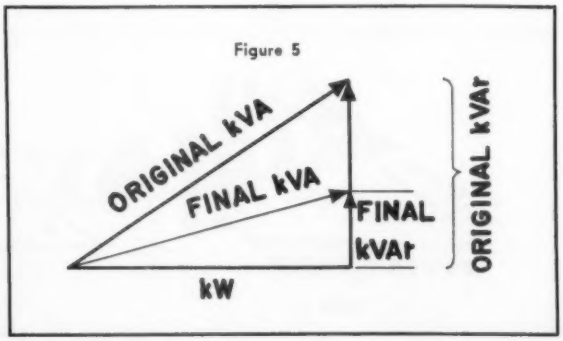

Figure 5

power factor of the load. At the same time, the overall efficiency of the motors is improved, resulting in a reduction in the unit consumption.

Even in the unlikely event of motors operating under full load conditions and so giving a power factor as high as possible for the load concerned, it is still probable that power factor improvement can be advantageously effected by the use of compensating equipment. Such equipment, in effect, generates or neutralizes the magnetizing or idle current required by the machines, thus reducing the current loading and improving the power factor.

The installation of compensating equipment can be effected on the network by the supply authority, alternatively in the sub-station or switch-room, or as will be shown later, better still on the works distribution system, by the consumer. The nearer to the offending load that the compensating equipment is installed, the greater are the benefits obtained.

Compensation may be effected by either rotating or static equipment; the choice depends entirely on local conditions. Briefly, the principal methods of compensation which may be adopted for the improvement of power factor on an installation are as follows:

1. Synchronous induction motors
2. Salient-pole synchronous motors
3. Salient-pole synchronous induction motors
4. Induction motors with phase advancers
5. Synchronous condensers
6. Capacitors

### Synchronous Motors

The three types under the first three headings are installed if large motors are required, and if the load is such that the motors are fairly constantly under full load conditions. Where these motors operate under, say, 60 percent of full load, the loss in efficiency has to be set against the saving obtained by power factor improvement.

Synchronous motors of all types are essentially used only under conditions where there is a definite mechanical duty, and where there is little possiblity of their being shut down for lengthy periods when the remainder of the plant is in operation.

*Synchronous induction motors* start up as standard slip ring induction motors, with the polyphase rotor winding connected through the usual starting resistances. When full speed is attained, the motor is converted to a synchronous motor, by short-circuiting the starting resistances and switching over to a d.c. exciter —which is generally directly coupled.

The main advantages of this type of synchronous machine are, that they start and synchronize against full load torque, and that they are able to withstand overloads. If the motor pulls out of step due to such overloads, it continues to run as an induction motor until such time that the load returns to normal, when it automatically pulls into step again and operates as a synchronous motor.

*Salient-pole synchronous motors,* on the other hand, may either be of the squirrel cage motor type, with auto-transformer starting; or alternatively, as far as starting is concerned, a slip ring machine may be provided. This type of motor has its main application on large constant-speed drives where a high starting torque is not required—for example, motor generator sets and compressors. The main disadvantages of this type of synchronous motor are that the control gear is expensive, and that the starting characteristics are limited.

The third type of synchronous motor, namely, the *salient pole-synchronous-induction* machine has the main advantages of the two former machines. It has the higher starting torque characteristics of the synchronous induction motor, and the higher efficiency of the salient pole type.

Starting and excitation windings are separate, and are connected to separate slip rings; the two slip rings from the excitation winding are connected to the exciter armature; the three from the starting winding are connected to the starter, and the starter winding to the supply.

The machine is started in a similar manner to the slip ring induction motor; and when up to speed, the starter contacts short-circuit the starting winding, and the exciter is switched on to the excitation winding. The machine then pulls into step and runs as a synchronous machine.

### Phase Advancers

This is another type of rotating machinery available for power factor correction of large motors, and in cases where the motor has to start against heavy loads, it is often more satisfactory and economical than other types of rotating plant. The rotating phase advancer supplies the magnetizing current to the rotor of the motor and so eliminates or reduces the wattless current taken from the supply, thus improving the power factor of the load taken by the machine.

It is general for this type of machine to be directly coupled to the induction motor, or driven through a suitable belt, chain, or gear by the motor shaft.

With this type of machinery it is necessary to take into account the decreased efficiency experienced, and to set this against the saving obtained by power factor correction.

### Synchronous Condensers

A synchronous condenser is, in effect, a salient pole-synchronous motor which runs solely to improve the system power factor, no mechanical load being driven by the motor. Overexcitation of such machines results in a leading current being taken from the supply, which neutralizes to some extent the lagging current taken by the other plant.

Within the rating of the machine, it is possible by suitable adjustment of the excitation to supply the desired amount of power factor correction.

The running costs of this type of equipment are high, compared with all other types of plant for power factor correction, and its most frequent use in the past has been in connection with long-distance power transmission lines for voltage regulation purposes by the

(*Concluded on page* 169)

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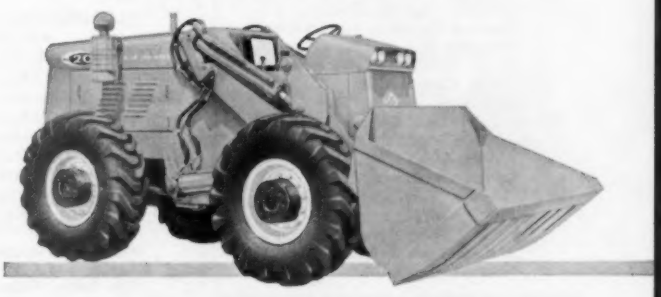

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# N.S.G.A.—N.R.M.C.A. Convention Program

## The Americana, Bal Harbour, Fla., Jan. 20-26, 1961

FRIDAY, JANUARY 20

2:30 p.m.—5:00 p.m.—N.S.G.A. Manufacturers Division

SATURDAY, JANUARY 21

Committee sessions all day

SUNDAY, JANUARY 22

11:00 a.m.—5:00 p.m.—Committee sessions

6.30 p.m. — 10:00 p.m. — N.S.G.A. and N.R.M.C.A. Past-Presidents' Reception and Dinner

MONDAY, JANUARY 23

9:30 a.m.—State and Area Associaion Conferance

Presiding officer—H. G. Feraud

"Co-operation of National Associations with State Association in the Matter of Specifications of the State of New York"—Paul R. Smith, executive secretary, Empire State Sand, Gravel and Ready Mix Association

"What a State Association Did to Preserve the Rail Shipment of Cement"—Joe E. Offut, executive secretary, Oklahoma Ready Mixed Concrete Association, Inc.

"Activities of State and Area Associations from the Standpoint of Public Officials"—Charles E. Proudley, director of engineering and executive secretary, Carolinas Ready Mixed Concrete Association

"Long Range Plans to Stabilize and Upgrade the Concrete Industry in Florida"—Paul Lenchuk, executive secretary, Florida Concrete and Products Association, Inc.

2:30 p.m.—Special program for sand and gravel companies using the navigable waters

Presiding officer—Charles M. Everhart, executive vice-president, Cumberland River Sand & Gravel Co., Nashville, Tenn.

Panel Discussion on injury compensation for seamen and longshoremen employees of the sand and gravel industry:

"The Jones Act and the Longshoremen's and Harbor Workers' Act"
Stephen A. Milwid,
Attorney-at-law,
Chicago, Ill.

The industry's experiences and safety programs:
Mr. Everhart
Allan P. Taylor, vice-president,
Ohio River Sand Company, Inc.,
Louisville, Ky.
Arnold I. Sobel, vice-president,
Material Service Division,
General Dynamics Corporation,
Chicago, Ill.
G. O. Griffin, director of safety,
Dravo Corporation,
Pittsburgh, Pa.

"Proposals for User Charges on Navigable Waterways"
Braxton B. Carr, chairman,
National Waterways Conference

"Effect of User Charges on the Sand and Gravel Industry"
E. K. Davison, president,
J. K. Davison & Bro.,
Pittsburgh, Pa.

TUESDAY, JANUARY 24

9:30 a.m.—Session 1 (simultaneous with Session 2)

NATIONAL SAND AND GRAVEL ASSOCIATION

Presiding officer—E. K. Davison, president N.S.G.A.

Address of the president
Mr. Davison

"What Sanitary Landfills Mean to Counties and Towns"—Donald E. Ball, Northern Virginia Construction Co., Alexandria, Va.

"Legislative and Judicial Developments in Percentage Depletion"—John T. Sapienza, counsel for associations

"Sand and Gravel Transportation by Rail—Soon Only a Memory?"—Charles E. Brady, lessees of B. V. Hedrick Gravel & Sand Co., Lilesville, N. C.

"Review of Sand and Gravel Research Problems"—Delmar L. Bloem, associate director of engineering

Presentation of Safety Awards

Amendments to constitution

Election of officers

9:30 a.m.—Session 2 (simultaneous with Session 1)

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—John B. Donovan, president, N.R.M.C.A.

Address of the president
Mr. Donovan

"A Producers Views of a Ready Mix Truck Rodeo"—Joseph B. Cook, vice-president, Pfaff & Smith Builders Supply Co., Charleston, W. Va.

"New Method for Determining Ready Mixed Concrete Volume in Detroit Through Co-operation With Cement Manufacturers"—Norman J. Fredericks, president, Koenig Coal & Supply Co., Detroit, Mich.

"Investigations of Methods for Measuring Mixing Efficiency of Truck Mixers" by Mr. Bloem and by Richard D. Gaynor and John R. Wilson of engineering staff—Mr. Gaynor

"Economic Understanding—A Challenge to Management"—Albert H. Chubb, manager, Personnel and Public Relations, Holloway Materials Corporation, Winter Park, Fla.

Presentation of Safety Awards

Amendments to constitution

Election of officers

2:30 p.m.—Session 3 (no simultaneous session)

NATIONAL SAND AND GRAVEL ASSOCIATION
NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—W. J. Hicklin Jr., vice-president, N.R.M.C.A.

"Planning for Growth in the Sand and Gravel and Ready Mixed Concrete Industries"—Stuart M. Berman, Booz, Allen & Hamilton, Chicago, Ill.

"A Balanced Highway System—Why We Need It and How We Get It"—Pyke Johnson, chairman, Highway Research Board, and former president, Automotive Safety Foundation

"The Outlook for Our Industries (Cement-Sand and Gravel-Concrete)"—Cris Dobbins, president, Ideal Cement Company, and immediate past-chairman, Portland Cement Association

WEDNESDAY, JANUARY 25

9:30 a.m.—Session 4 (simultaneous with Session 5)

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—Charles W. Ireland, chairman of the board, Consumers Co., Division of Vulcan Materials Co., Chicago, Ill.

"New Markets for Ready-Mixed Concrete"—George H. Paris, director of promotion, Portland Cement Association, Chicago, Ill.

"Management Responsibilities to Salesmen to Insure Profits"—Ernest S. Kilgore, manager, Pinellas Concrete Products Division, St. Petersburg, Fla.

"Mobile Radio As a Merchandising Tool"—Kenneth B. Campbell, Concrete Supply Co., Charlotte, N. C.

"What Quality Guarantee Should the Ready Mixed Concrete Producer Give His Customer?"—Stanton Walker, director of engineering

Session 5 (simultaneous with Session 4)

NATIONAL SAND AND GRAVEL ASSOCIATION

Presiding officer—Robert F. Porter, chairman, operating problems committee

Note: No formal papers have been prepared for this session. The time has been allotted to present ideas and to ask questions on any phase of sand and gravel plant operations and on specifications and other factors which affect operations. To get discussion under way, individuals have been selected to make brief informal comment on subjects suggested as being of special interest, including: prospecting and exploration, trash removal, jigs and heavy media, screening, and winter problems.

JOINT LUNCHEON
12:30 p.m.

Presiding officer—John B. Donovan

Address by The Honorable Luther H. Hodges, Governor of North Carolina

2:30 p.m.—Session 6 (simultaneous with Session 7)

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—Ralph H. Anderson, chairman, committee on public relations

Public Relations—General—Mr. Anderson

Community Relations—Gary L. Marable, general manager, Ready Mix Concrete Co., Inc., Fort Lauderdale, Fla.

Safety—Quentin W. Best, executive vice-president, Consolidated Rock Products Co., Los Angeles, Calif.

Care and Cleaning of Fleets—H. Irving Rhine, president, Bode Gravel Company, San Francisco, Calif.

Driver Training—Roger H. Slugg, vice-president, The Hamilton Gravel Co., Hamilton, Ohio

Good Housekeeping, Plant—Raymond F. Powell, executive vice-president, Basic Materials Co., St. Louis, Mo.

2:30 p.m.—Session 7 a, b and c (simultaneous with Session 6)

NATIONAL SAND AND GRAVEL ASSOCIATION
NATIONAL READY MIXED CONCRETE ASSOCIATION

Clinics on technical problems

(a) Standard testing procedures for aggregate and concrete, conducted by Mr. Gaynor

(b) Calculating proportions for concrete, conducted by Messrs. Bloem and Wilson

(c) Special problems of specifications, uses and acceptance, by Mr. Walker

THURSDAY, JANUARY 26

9:30 a.m.—Session 8 (simultaneous with Sessions 9 and 10)

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—George R. Bathe, president, Ready Mixed Concrete Co., Omaha, Nebr.

"Variations in Portland Cement"—progress report on investigation—Mr. Gaynor

"An Automatic Ready Mixed Concrete Plant With Capacity of 300 Cubic Yards Per Hour"—Louis A. Gottheil, engineer, Ready Mixed Concrete Service, Miron Company Limited, Montreal, Canada

"The Technical Control of Ready Mixed Concrete"—M. F. Macnaughton, vice-president, Mount Royal Paving and Supplies, Ltd., Montreal, Canada

"Accelerated Cement Tests Aid Producer Control"—Walter K. Wagner, chief engineer, Albuquerque Gravel Products Company, Albuquerque, N. M.

"Problems of Ice Removal from Pavements"—William E. Dickinson, president, Calcium Chloride Institute

9:30 a.m.—Session 9 (simultaneous with Sessions 8 and 10)

NATIONAL SAND AND GRAVEL ASSOCIATION

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—George W. Garrett, president, Stewart Sand & Material Co., Kansas City, Mo.

"Depreciation and Other Taxation Problems"—Mr. Sapienza

"Application of Electronic Data Processing to a Sand and Gravel and Ready Mixed Concrete Operation"—B. L. Bradley, secretary and controller, T. L. Herbert & Sons, Nashville, Tenn.

"Considerations Which Should Guide Producers in Developing Employee Benefit Programs"—Henry H. Kirwin, treasurer, Eastern Rock Products, Inc., Utica, N. Y.

Panel Discussion:

Depreciation, James R. Spear
vice-president,
The Dolese Company,
Oklahoma City, Okla.

Budgeting and Forecasting,
A. J. Selzer, secretary,
Concrete Supply Company,
Charlotte, N. C.

Operating Cost Ratios,
Kenneth E. Tobin Jr.,
associate managing director

9:30 a.m.—Session 10 (simultaneous with Sessions 8 and 9)

NATIONAL SAND AND GRAVEL ASSOCIATION

Presiding officer—Edward K. Davison, chairman, committee on public relations

"Some Practical Aspects of Zoning as Related to the Sand and Gravel Producer"—Richard E. Hole, attorney-at-law, Greenville, Ohio

"The Lincoln Lakes Project as a Part of our Land Rehabilitation Program"—R. E. Weaver, vice-president, The Lincoln Sand and Gravel Co., Lincoln, Ill.

"Our Company's Experience With a Program for Development of Good Community Relations"—Robert S. Barneyback, vice-president, Henry J. Kaiser Co., Oakland, Calif.

"Development of Good Community Relations for the Sand and Gravel Industry in Great Britain"—Col. H. E. Peirce

2:30 p.m.—Session 11 (simultaneous with Session 12)

NATIONAL SAND AND GRAVEL ASSOCIATION

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—Charles E. Brady

"Admixtures for Concrete"—Mr. Gaynor

"Gravel for Railroad Ballast"—Rockwell Smith, research engineer roadway, association of American Railroads

"How to Make the Best Use of Sand and Gravel in Asphalt Paving Mixtures"—J. M. Griffith, engineer of research, The Asphalt Institute

"Review of Investigations of Maximum Size-Strength Relationships"—Mr. Bloem

2:30 p.m.—Session 12 (simultaneous with Session 11)

NATIONAL SAND AND GRAVEL ASSOCIATION

NATIONAL READY MIXED CONCRETE ASSOCIATION

Presiding officer—Fred P. Curtis, vice-president, N.S.G.A.

"The Principal Problems of the Ready Mixed Concrete Industry—as I See Them"—Herbert Jahncke, vice-president and treasurer, Jahncke Service, Inc., New Orleans, La.

"The Principal Problems of the Sand and Gravel Industry—as I See Them"—J. L. Shiely Jr., executive vice-president, J. L. Shiely Company, St. Paul, Minn.

"The Washington Scene"—Vincent P. Ahearn, managing director

## Power Factor Correction

(*Concluded from page* 165)

supply authorities. Of recent years, however, this practice has been largely superseded by the installation of large banks of static capacitors.

### Capacitors

Progressively during the last 30 years it has been found that for the majority of industrial loads the capacitor provides by far the most satisfactory and convenient method of power factor improvement. This has been due to exceptionally high efficiency and reliability, lack of moving parts, and maintenance.

### Preliminary Considerations

Prior to embarking on a scheme for power factor correction, it is advisable to consider the matter from three main points of view, namely:

1. *Engineering Aspect* — which will ensure that full use is made of the installation in regard to the distribution system within the factory, and that preventive measures have been taken by reselection of motors or re-arrangement of drives to improve the inherent power factor.

2. *Commercial Aspect*—which of necessity is of importance, as it is advisable to ensure that minimum outlay of capital expenditure is incurred to give the desired degree of power factor correction compatible with the technical considerations of each individual installation.

3. *Supplier's Requirements*—this has to be taken into account, for it must be realized that leading power factors at periods of system light load are likely to cause the supplier unnecessary system disturbance. This results in certain authorities stipulating that control of corrective equipment must be such that sustained leading power factors cannot be permitted.

From the above it will be readily apparent that automatic control of the correction to be installed is often desirable, and that the corrective equipment should be sited as near as possible to the plant responsible for the low power factor.

• • • • •

*The concluding section of this article will appear in the February issue of* PIT AND QUARRY.

• • • • •

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TESTING SCREEN

Controls and guarantees your product. Fast, accurate, trouble-free test sizing of crushed stone, sand, gravel, slag, etc. Size range: 4-in. to 200-mesh.

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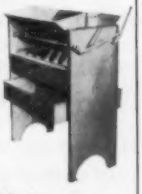

Reduces large samples for convenient testing. Adjusts for all materials, sand to heavy aggregate. Simple to use. Heavy welded steel construction.

*Porta Screen*

Portable. Motor or hand driven. Operates free-standing. Samples up to 25 lbs., 1½-in. to 200-mesh. Does not replace GILSON Testing Screen for heavy-duty test sizing.

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Enter 169 on card, page 183

**The over-all objective of management prerogatives is to achieve maximum operational effectiveness in the company. The proof of their success is the degree of operational effectiveness achieved.**

# management prerogatives are important

## Do You Know Yours?

By **ROBLEY D. STEVENS**
Management Consultant

AS labor relations in this country assume ever greater importance, employers in the nonmetallic minerals industry will focus more and more attention on the role of management prerogatives, for the preservation of the American free enterprise system. It may be a good idea to check your knowledge of collective bargaining provisions concerning union and management functions, rights, and responsibilities by the accompanying chart.

Where no union exists and there is no collective bargaining, company management alone determines its action affecting the employees. Spokesmen for management at a meeting of the President's National Labor-Management Conference classified management functions in these two groups: (1) those which are the absolute prerogatives of management and not subject to collective bargaining, and (2) those on which management makes initial decisions but where the consequence of such actions or decisions may be reviewed through the grievance procedure.

On the other hand, labor members of the National Labor-Management Conference opposed any listing of management functions on the ground that this would tend to encourage a rigidity in the personnel relations functions subject to collective bargaining. It was pointed out that with the growth of mutual understanding, a responsibility of one of the parties could well become the joint responsibility of both parties.

It is true, however, that some of the authority of company management in the field of industrial relations has been to some extent limited by various labor laws, such as the Labor-Management Relations Act of 1947 and the Fair Labor Standards Act of 1938, as amended. In addition, the adoption of the collective bargaining agreement also constitutes some curb on company management's authority.

Do you believe that a clear demarcation of collective bargaining and your management rights is necessary in order to prevent one from impinging on the other? For this reason, do you favor the inclusion in your agreement of statements on the powers reserved to your management?

Because your agreement restricts your management functions, do you deem it essential to specify those matters which are not limited by your agreement and which are necessarily and essentially reserved for management? Is it your opinion that such express statements tend to reduce the area of possible conflict and protect management's rights in the disposition of grievances over disputable issues and in arbitration on matters not specifically covered by your agreement?

Do you believe it is advisable not to list your specific management rights in your agreement with the union, if there is one? Do you fear that such a statement, because of its possible incompleteness, may jeopardize functions which your management regards as its prerogatives. In other words, do you think that specific enumeration of your management right might be interpreted as limiting your management to those

points enumerated in your agreement?

Obviously management prerogative clauses in some agreements list the specific rights to management, while others state broadly that management reserves to itself all rights, powers, and authority not expressly modified or abrogated in the agreement, without specifying these rights.

In agreements which explicitly state management rights, these two broad categories are usually included:

1. Decisions dealing with the tangible aspects of the company business, such as the determination of number and location of plants, types, of products to be made, technological methods and processes, materials, finance and price policies, management practices.

2. Decisions in the field of employer-employee relationships, such as the direction of the working force, hiring, transfer, promotion, suspension or discharge for cause, lay-off for lack of work, and maintenance of discipline.

In analyzing company management prerogatives, clauses on this subject should be considered in conjunction with other provisions in the agreement which may affirm or modify management's stipulated discretionary powers. *(Turn page.)*

## MANAGEMENT PREROGATIVES CHART

| | Yes | No |
|---|---|---|
| The union recognizes that the management and operation of your company's business is vested solely in your management. | ( ) | ( ) |
| It is understood and agreed to by the union that your company has all the customary and usual rights, powers, functions, and authority of management. | ( ) | ( ) |
| Except as otherwise expressly provided in your agreement, nothing in your agreement contained shall be deemed to limit the company in any way in the exercise of the regular and customary functions of management. | ( ) | ( ) |
| The union recognizes and agrees that except as expressly limited by the provision of your agreement, the supervision, management, and control of your company's business, operations, and plant are exclusively the function of your company. | ( ) | ( ) |
| The right to hire, release, or discipline for just cause and to maintain discipline and efficiency of your employees, is the sole prerogative of your company. | ( ) | ( ) |
| It is recognized by the union that your company possesses the general right of managing and operating your plant; directing your working force, including the rights to hire, transfer, promote, demote, and discipline your employees; determining the extent and kind of operations; continuing, abandoning, replacing present or future equipment; and making reasonable rules. | ( ) | ( ) |
| The union agrees that the products to be produced, materials used, establishment/discontinuance of shifts and jobs, means of manufacturing, use of labor-saving techniques and equipment, production required, determination of job content, judgment as to ability of an employee to handle a job, or any other prerogative of management not specifically excepted in your agreement shall be solely and exclusively within the unreviewable responsibility and prerogatives of your company and not subject to settlement as a grievance or by arbitration. | ( ) | ( ) |
| The union shall not abridge listed rights in your agreement reserved as your management prerogatives. | ( ) | ( ) |
| The union recognizes that your company's right to manage its affairs, hire, discharge, promote, demote, and direct the working force is unqualified as long as this right is not used in violation of your agreement. | ( ) | ( ) |
| The right to evaluate jobs and establish job standards is vested exclusively in your company, and is not subject to the grievance procedure. | ( ) | ( ) |
| The determination of comparative qualifications and physical fitness of your employees having different seniority ratings, is the prerogative of your management. | ( ) | ( ) |
| Nothing in your agreement shall abridge the right of management in the employment of qualified personnel, dismissal of employees for just cause, rearrangement of work processes or methods of economy and efficiency. | ( ) | ( ) |
| It is agreed by the union that the management of your company has the sole and exclusive rights to manage its affairs and to direct the working force in accordance with, and subject to, the terms of your agreement. | ( ) | ( ) |
| The standard rules and regulations of your company shall continue in full force and effect, and management has the right to amend them. | ( ) | ( ) |
| Your company will prescribe rules, not conflicting with your agreement, such as are deemed necessary in the operation of your business. Such rules are to be posted for your employees' notice. | ( ) | ( ) |
| It is agreed by the union that there shall be no trade-union activities during working hours or on the premises of your company. | ( ) | ( ) |

**Management Rights Clauses** Does your company agreement contain clauses which set forth in very general terms the rights reserved for management, such as the managing and operating of the company or the regular or customary functions of management, without specifying in detail what these rights are?

Does your agreement include specific clauses listing (in detail) the unqualified prerogatives of management? In addition to listing the rights, do any of your clauses define the meaning of terms such as "managing and directing working force" and "just cause for discharge"?

Is the enumeration of rights reserved to and retained by your management agreement qualified by the statement that the exercise of such rights is subject to other provisions? Such a proviso usually is implied although not actually stated in some agreement. Of course, no definitive statement of your management's rights can be made without checking your entire agreement for clauses which might restrict the rights enumerated.

Does any clause in your agreement limit your managerial authority? This may be done by (1) a statement that all or a part of the management rights listed in the agreement may be subject to grievance procedure; (2) by a requirement of consultation with the union in some way; or (3) by a specific exclusion of certain matters—such as wages, hours, and working conditions—from management's authority and a provision that they will be subject to change only through collective bargaining.

Does any of your management right clauses make explicit what is implied in your contract as a whole—that is, in exercising its recognized functions management shall not discriminate against employees because of union membership? In effect, such limitations merely restate the ban on union discrimination contained in the Labor Management Relations Act of 1947.

Do you have a saving clause insisted upon in your agreement? (A specific listing of topics regarded as management functions might prejudice your right to act in matters not covered by your agreement.) Such clauses or statements are tantamount to stating that the listing of specific rights is not to be considered as all-inclusive—meaning that the employer has not relinquished any rights or functions not listed.

**Company Rules** In operating your company, directing your working force, and of course, maintaining discipline, you, as management, will customarily adopt certain rules regarding conditions of employment with which the union, if there is one involved, will be concerned as the bargaining agent for your employees.

Your agreement specifically and tacitly permits management to establish reasonable and necessary company rules. A proviso may be made that the exercise of the right to issue and enforce company rules will not conflict with the terms of the agreement, or that your rules will be applied without discrimination.

It goes without saying that management usually has the right to make or change company rules if these are not inconsistent with the contractual terms of the agreement.

A company is held responsible for notifying employees of its customs, practices, and rules governing employment conditions. Management's rights to take disciplinary action, including discharge for violation of company rules or misconduct, will be regularly recognized in an agreement, if none of the rights guaranteed in the agreement are abridged.

**Union Functions** An agreement should provide that the union will be informed of your company wage rates, current and new job descriptions, timekeeping records, and other instructions and data relating to hours, wages, or working conditions.

Both the National Labor Relations Board and the courts have recognized the right of a union to carry on certain activities on the employer's property. At the same time, to safeguard company property rights and to maintain discipline, management may have a restriction in its general agreement (or regulation of) the kind and extent of activities permitted. Some agreements, however, permit union activities other than the handling of grievances on company time.

**Other Pointers** Every company has some form of management prerogatives, even if these amount to only production controls and personnel administration. You have management prerogatives in your company now; but how effective are they?

Management prerogatives may be defined as rights resulting from the organization and employment of resources to accomplish predetermined objectives. The over-all objective of management prerogatives is to achieve *maximum operational effectiveness* in the company. The proof of their success is the degree of operational effectiveness achieved. The primary reason for concerning yourself with management prerogatives is, of course, to lead to better company management.

If you now handle labor relations problems in your company, or if you will be handling them in the future, you will save yourself considerable trouble if you know about your management prerogatives.

---

### New Alnore Grinding Plant To Be in Operation Soon

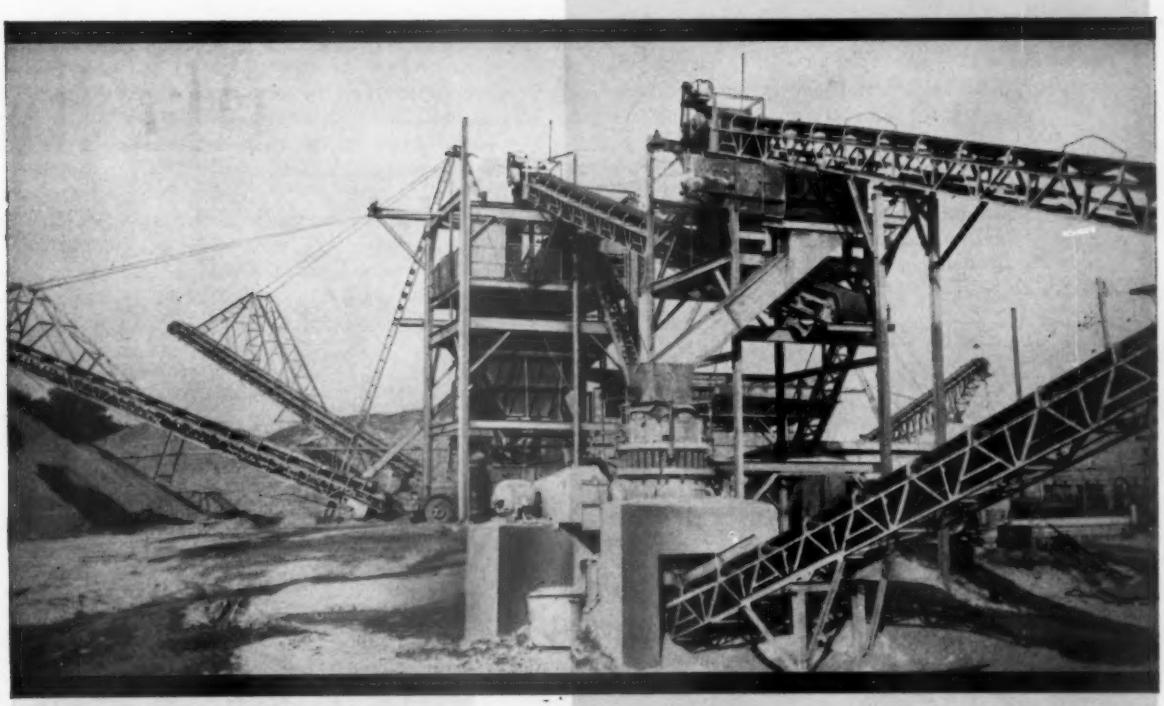
The new plant of Alnore Mineral Company near Erie, Mich., will be in operation soon. It will offer a custom grinding service and it is equipped to reduce ore to various sieve sizes ranging from 20-mesh to sub-sieve particles.

Extremely fine particle size products will be reduced in a ceramic-lined Majac mill operated with super-heated, compressed air. Material can be received by water or rail; and storage facilities will be available for bulk or bagged materials.

---

Universal Atlas Cement Division of the United States Steel Corporation has secured options on three sites for cement distributing stations along the eastern seaboard. The sites selected are at Norfolk, Va., and Jacksonville and Port Canaveral, Fla. Construction has begun on a cement distributing station in St. Louis, Mo.

# HOLLY MANUFACTURING AND MINING COMPANY processes 300-400 tons of gravel per hour with 5 SIMPLICITY screens!



Write for information on Simplicity equipment today.

At the Holly Manufacturing and Mining Company, Holly, Michigan, pit run gravel is brought from the pit to a surge pile on belt conveyors. From the surge pile, a belt conveyor takes the gravel to a Simplicity 5′ x 14′ Model "D" 2-deck screen. At this point, all oversize material, including rocks up to 8 inches in diameter, is run through a cone crusher and then re-circulated to the screen. A belt then takes all through material to two Simplicity M-11 4′ x 12′ 3-deck screens where the gravel is washed, sized, then stockpiled to be used as needed. The other 2 Simplicity screens are used for processing special products.

All 5 Simplicity screens have been in operation for over two years, part of the time on a two-shift schedule, with a minimum of down time.

Gravel plant operators are getting quick, economical and dependable processing of their material with Simplicity Screens, Feeders and Conveyors.

**Simplicity**
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**FOR EXPORT:** Brown & Sites, 50 Church Street, New York 7, N. Y.

# "My TD-24 almost equalled ...*My faster TD-25's*

Enter 174 on card, page 183

# size-bigger crawlers *deliver larger loads"*

## —Charles W. McClinton, Oakman, Alabama

**"Actual on-the-job demonstration** proved my 4-year-old International TD-24's daily production approximately equalled size-larger competitive crawlers," reports Charles W. McClinton, for McClinton Coal Company, Oakman, Alabama.

"My TD-25's are faster all-around, and deliver larger loads than the '24.' Planet Power-steering lets the operator cut big loads faster (than a clutch-steered, king-sized crawler)—and delivers the loads at a constant speed without loss of power on turns."

### "Dead-track drag" eliminated

Planet powered International TD-25's keep both tracks pulling full-time—to make full-load, full-power turns, or slam straight ahead with offset loads. And combined on-the-go, Hi-Lo power-shifting gives instant, up-or-down matching of power to condition.

You make full-load turns, and keep the blade loaded. You get constant-contact benching or highwalling, applying full power, getting full speed. "Dead-track drag" and "gear-shift lag" are eliminated.

*Exclusive Planet Power-steering makes the TD-25 the industry's only power-shifted 8-speed gear-drive tractor or 4-speed torque converter tractor.*

***Power-shift and power-steer*** the 230-hp TD-25 on tough overburden removal, benching, and highwalling. Prove what it means to your operating efficiency to match or outproduce size-bigger, clutch-steered crawlers. See your International Construction Equipment Distributor!

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**International Harvester Co.,**
**180 North Michigan Ave., Chicago 1, Illinois**
**A COMPLETE POWER PACKAGE**

**Overburden 20 feet deep,** half earth, half rock, is being removed here to get at a 16-inch coal seam. This McClinton-owned TD-25 cuts down highwall, and removes berms. Operator simply shifts load-side track to high range, leaves other in low range to keep "25" on course without "bank-nosing."

**Planet Power-steering** and on-the-go, Hi-Lo power-shifting teams with the 6-cylinder, 230-hp International DT-817 diesel—to pick up and "run" with loads like this, on the McClinton strip-mining operation. Dual valving makes this engine a "free breather," to give peak turbocharging efficiency.

"THIS LUBRICANT PRACTICALLY ELIMINATED BEARING REPLACEMENTS"

Says- C. O. SPARKS, INC.
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"Prior to using LUBRIPLATE, we were replacing shaker screen bearings within 60 to 120 days due to lack of or faulty lubrication. Since we started using LUBRIPLATE seven years ago, we have only replaced two shaker screen bearings and these because of natural wear. We now use LUBRIPLATE for general lubrication throughout our plant."

*W. T. Ellington, President*
*Mundo Engineering Co.*

**REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.**

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Enter 176-A on card, page 183


# Legal Decisions

## On Industry Problems


**By LEO T. PARKER**
Attorney at Law
Cincinnati, Ohio


ANOTHER P&D EXCLUSIVE

DURING the last few weeks the writer made special and time-consuming efforts to collect outstanding law cases which I believe will impart valuable legal information likely to assist readers to avoid many thousands of dollars in future legal expenses and incidentally, save valuable time. I shall briefly review these important and interesting decisions and, in addition, answer certain legal questions recently sent in to me by readers who should, for their own benefit, clip this article for future references. Many of the herein cited higher court cases reverse old law and these new cases can be advantageously used by readers and their lawyers to win unavoidable law suits. Readers who desire details of any specific law suit can refer to the citation and readily obtain and read the complete decision in any good library.

### Law of Loaned Employee

In the past innumerable higher courts have held that a special employer to whom another's employee is "loaned" will become liable for injuries to the employee where there is a contract of hire between the employee and the special employer; where the work being done at the time of the injury is essentially that of the special employer; and the right to control the details of that work is in the special employer.

Last month a higher court reversed this old law pertaining to employees who are temporarily "loaned" to another employer.

For illustration, in *S. Company* v. *Industrial Board,* 355 Pac. (2d) 389, it was shown that one Paul was employed regularly by the S. Company on a rock crusher. One day Paul was advised by the company's foreman that he was to report for work on the hot asphalt plant of P. Company for a week or ten days, after which time he would return to work on the rock crusher for S. After completing his work on the rock crusher for S., Paul went to the batch plant. While he was oiling the bucket conveyor another employee activated the machinery, and Paul was severely injured.

In subsequent litigation, the higher court held that the S. Company must pay compensation or damages to Paul because the testi-


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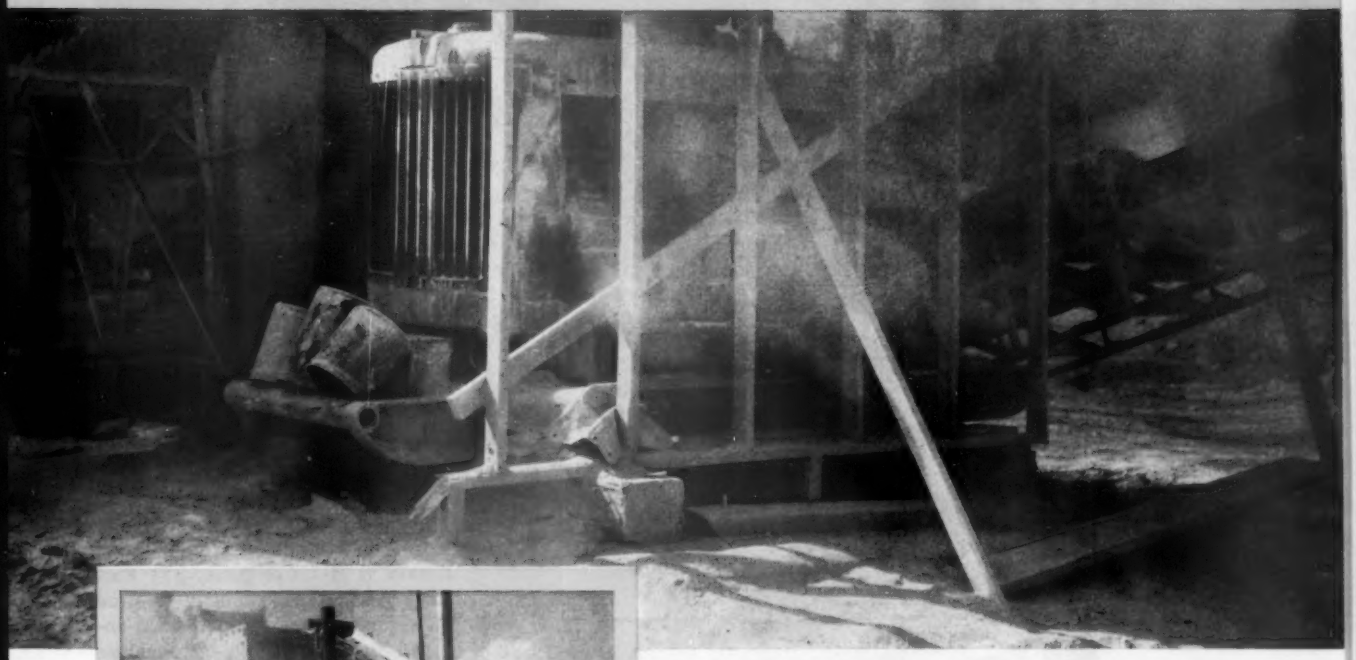
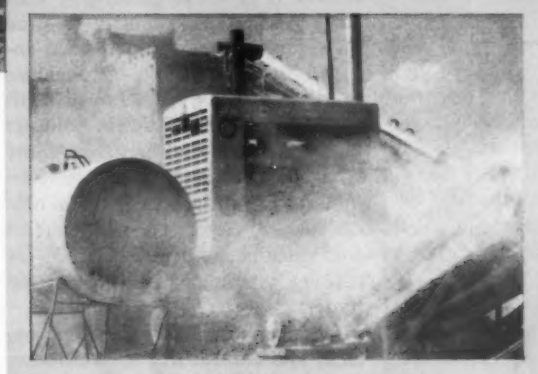
# 8 Years of steady power in a CLOUD OF DUST!





Latest boost to International's reputation for rugged dependability is the new turbocharged 385-hp UDT-817 diesel—ideal crushing power under all operating conditions.

**Working 60 hours per week,** this IH diesel has produced countless tons of material under the most adverse conditions. Production called for 50% minus 40 crushing—almost powder—which resulted in a constant cloud of abrasive dust floating around the engine. In spite of this, the rugged International diesel worked steadily for six years, took time out for an overhaul, then started off again with the same dependable service, adding two more years to the record.

**Dust-defying International diesels** are your surest investment for long, continuous performance under tough operating conditions. Full sealing protection keeps out abrasive grit, adding life to IH power on dusty crushing jobs. Inherent heavy-duty design assures trouble-free performance through continuous hours of big-capacity operation. And famous International economy keeps daily operating costs at a low figure.

## International diesel delivers eight years of dependable power for Adrian Materials, Inc., Jefferson City, Mo.

**Your power requirements** can be met quickly with a call to your nearby International Engine Distributor or Dealer. He'll give you full product information and installation assistance on 35 diesel or carbureted models—stripped engines to complete power units—from 16.8 to 385 max. hp. Call him today!

**INTERNATIONAL®**
**IH ENGINES**

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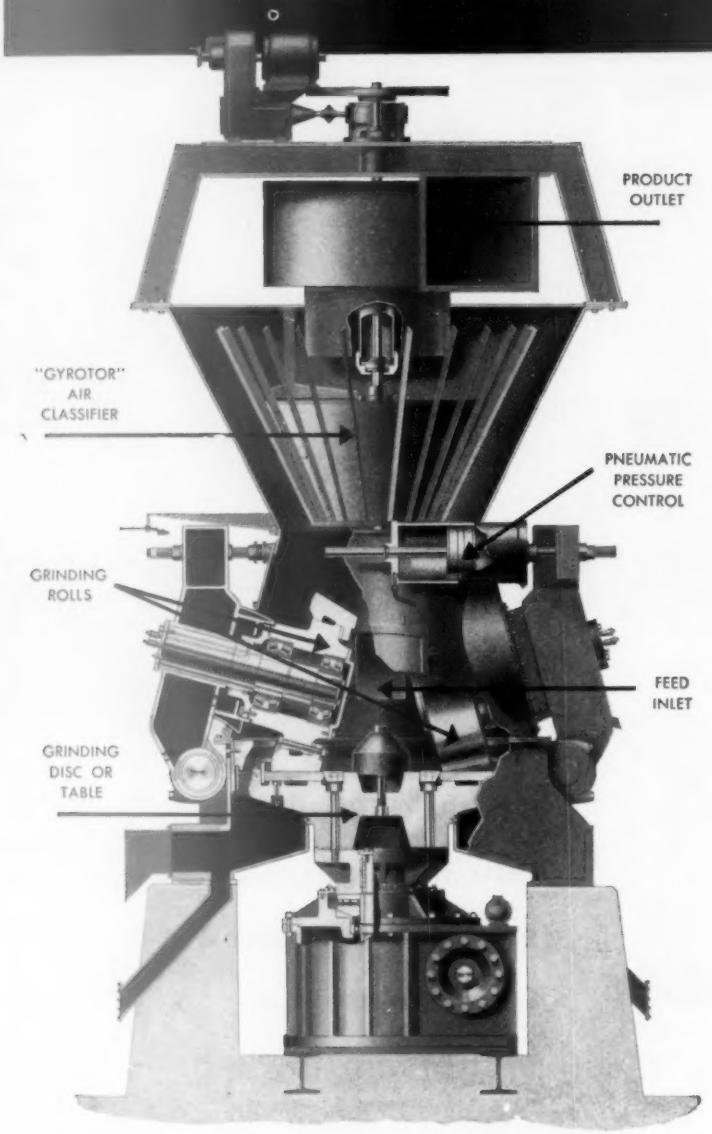
A COMPLETE POWER PACKAGE

# DISC-ROLL MILL




The Hardinge Disc-Roll Mill is applied to dry grinding of minerals such as talc, limestone, coal, phosphate rock, bauxite, clays, celestite, and gypsum. The Disc-Roll Mill incorporates pneumatic roll-loading. Since the pressure on the rolls can be released or increased at will, complete flexibility of operation results. The problem of over-loading is eliminated. Also, the Hardinge "Gyrotor" Classifier is standard equipment on the Disc-Roll Mill. This classifier provides very close control of the finished product over a wide range of sizes. Ask for Bulletin 52-8.

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Enter 178 on card, page 183


mony showed that Paul was never told that he was being transferred to other company, and he did not agree to such a transfer.

The court said:

"The relationship of employer-employee can only be created by a contract, which may be express or implied. Once created, the relationship cannot be changed to substitute another employer without employee's consent. The employee must have understood and agreed before there can be any transfer to another employer. Consent of the employee to a change in masters cannot be implied merely from his obedience to the order of his master."

### Union Pays $50,000 Damages

A few weeks ago a higher court held a labor union liable in $50,000 for calling a strike against a contractor instead of submitting the controversy to arbitration, as specified in the contract between the contractor and the union.

For illustration, in *United Association* v. *A-1 Company,* 351 Pac. (2d) 965, the testimony showed these facts: One Stine has been engaged in the sale of merchandise and contracting business for a number of years. Stine had a contract with a labor union under which any labor disagreement should be submitted to arbitration. The union officials were displeased with certain acts of Stine, and felt that he was causing unemployment among the trade.

Without submitting the disagreement and controversy to arbitration the union called a strike. Stine sued the union for heavy damages contending that the union destroyed his business by calling the strike which deprived him of employees to work for him; and that his contract jobs were brought to a halt.

The jury awarded Stine $50,000 damages and the higher court approved the verdict, saying:

"Any company or person may violate the most solemn contract he has made, but he thereby becomes responsible to the injured party for such violation."

### Union Black-Listed Contractor

A few weeks ago a higher court rendered an unusually important decision to the effect that a union may, without liability "black-list" a



Enter 179 on card, page 183 →

# 4-in-1 clam-handles more quarry jobs than any single-action rig!

### It's a fast-producing bulldozer!

**With the clam open and blade segment in 'dozing position,** this TD-15 Four-in-One does quarry clean-up after blasting—doubles for a full-size, full-capacity bulldozer. Then with clam-action, the "15" picks up and drops large rock slabs on the quarry floor—to break them so the power shovel and jaw crusher can handle them. Owner: Cedar Bluff Stone Co., Princeton, Kentucky.

**And the 4-in-1 is a multi-purpose clamshell** that can strip and grade with accuracy—"clam-handle" and load heavy, unwieldy materials, like stumps, that other loaders can't touch! Prove to yourself the 4-in-1 can give you *whole job* "equipment spread" utility—and give you more in earning capacity than any single-action rig built! Let your International Drott Distributor demonstrate.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL® DROTT®

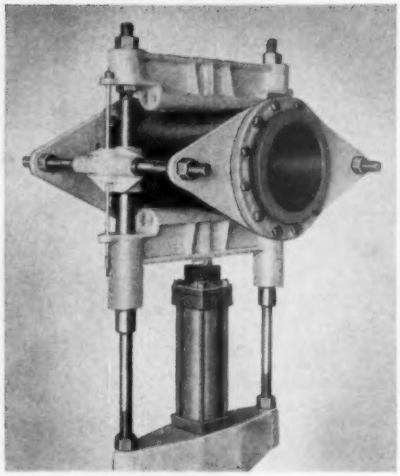
### It's a back-dragging clamshell!

**With his TD-6 Four-in-One's** clam in back-dragging position Herbert Wing, owner of West End Construction Company, Oneonta, N. Y., pulls down bank gravel by the truck load—for fast, easy loading. "The 4-in-1 is the only loader for me," states owner Wing. "It is versatile, to do the jobs of several machines, yet with a single-machine investment. It's fast, and the direct-start, 6-cylinder engine gives plenty of power."

### It's a shovel-beating loader!

**Dulin Bauxite Co., Murfreesboro, Arkansas,** uses this International Drott TD-15 Four-in-One as a 'dozer for clean-up of gypsum after blasting. Then the 4-in-1 loads out trucks faster even than their fast-swinging power shovel. "We use the 4-in-1 as a loader, and just like your advertising says, as a clamshell, a shovel, and a dozer," states Mine Superintendent Ralph Lewis. Note exclusive and positive 4-in-1 bottom-dumping.

# AUTOMATED *Hydral-60* PINCH VALVE SYSTEMS



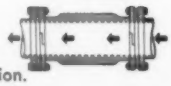
## Controlled circuitry for any operating requirements

- The Massco-Grigsby Hydral-60 System consists of one or more pinch valves with a single automatically operated hydraulic pump.
- Hydraulic pump may be operated by electric motor or by air from normal plant supply system.
- Valves may be the same or different size.
- Valves in the system may be operated simultaneously or independently.
- Control valve may be manual or solenoid.
- Valves are self-supporting and may be operated in any position from horizontal to vertical.
- Valves may be coordinated and interlocked with other plant equipment to automatically control tank levels, rate of flow, etc.
- Valves may be independently controlled for normal or rapid closure.
- Valves may be held fully open, fully closed, or at intermediate positions.
- Remote control to meet individual requirements.
- Controls may be included for automatic emergency operation.
- 3" to 14" I.D. sizes, with 50, 100, and 150 psi line pressure ratings.
- Temperatures to 200° F.

## Advantages of Massco-Grigsby Pinch Valves

- Rubber, neoprene and special compounded rubber sleeves *for corrosive and abrasive pulps and liquids.*
- Patented "hinged" sleeve. Recesses serve as "hinges" during compression; reduce strain and permit tight closing.

- Unobstructed flow eliminates high friction loss and prevents contamination.



- Split flanges and patented Flex Seal ends assure perfect seal.
- Rugged, heavy duty construction for most severe service and long life.
- Cannot leak or stick.
- No working parts in contact with pulp or liquid; no packing glands.

***WRITE FOR NEW CATALOG NO. 609***

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***Enter 180 on card, page 183***


nonunion contractor who fails to abide by the union's rules and regulations.

For instance, in *John* v. *Building Trades Council,* 352 Pac. (2d) 821, the testimony showed that a subcontractor submitted a bid to a general contractor to do work on the construction of a building. His bid was the low bid on this job. The general contractor would have accepted the bid on the job, but for the fact that the building trades council and the local union had put the subcontractor on their "We do not patronize" list. The reason for this was the subcontractor's refusal to confine the hours of his work to a 40 hour week. The subcontractor sued the Building Trade Council for damages claiming that by the loss of the contract he had suffered damages in the amount of $1,500, and further general damages.

The higher court refused to award the subcontractor any damages.

This higher court explained that the attempted regulation of work bore reasonable relevance to labor conditions and that it was not unlawful for the union to black-list the subcontractor in an attempt to require him to observe a 40-hour labor week.

### Receipts and Bills of Lading

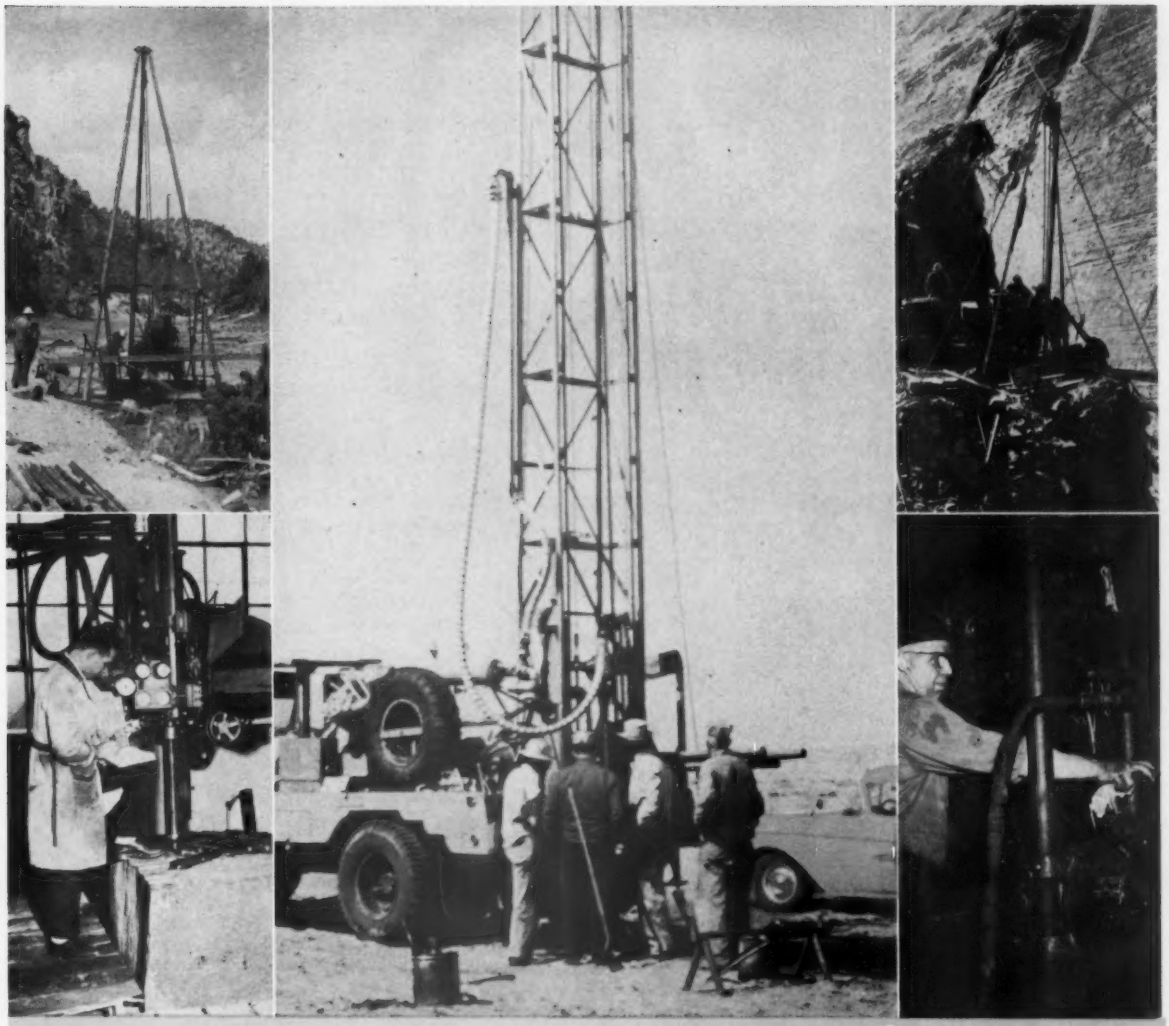
A few weeks ago I received an interesting letter from a reader, in part, as follows:

"If a bill of lading shows on its face valuable merchandise, can a purchaser of the bill of lading recover from the carrier when he discovers that the bill of lading falsely and incorrectly describes the merchandise?"

The answer is: Generally, no.

For example, in the leading case of *Wills* v. *White,* 150 S. E. 36, the testimony showed that a seller, named Wills, represented to a prospective purchaser that he owned three cars of valuable metal worth approximately $126,000. Wills displayed bills of lading having on their faces the name of the valuable metal which was being transported by a railway company and consigned to Wills. The purchaser purchased the bills of lading for $123,000, and took title to the

(*Continued on page* 187.)



## Operate at "Less cost per foot" . . .

. . . with Christensen diamond bits and core barrels "engineered" for your particular drilling problem. Experienced field consultants are available regardless of your job location or scope of operations.

*"Less cost per foot"*

**CHRISTENSEN DIAMOND PRODUCTS**

MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
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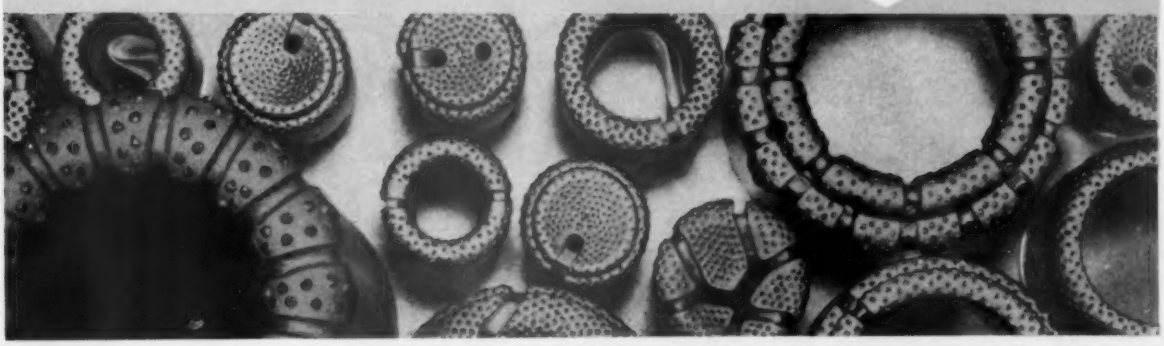
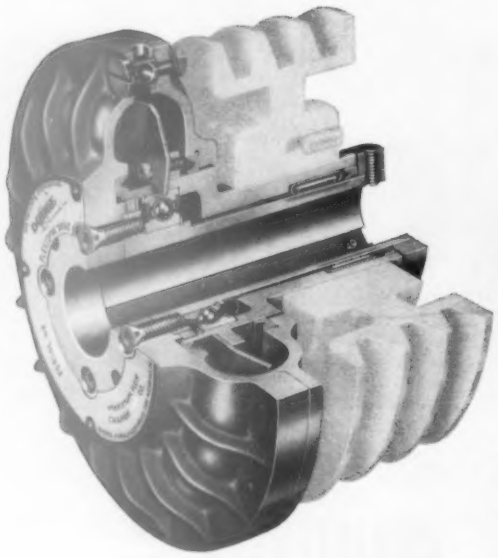
SERVICE FROM WORLD-WIDE SALES OFFICES AND MANUFACTURING PLANTS



# WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



# FLEXIDYNE

## THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

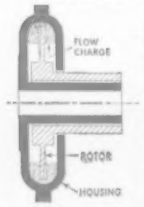
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 4000 Union St., Mishawaka, Ind.

### HOW FLEXIDYNE WORKS




The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

**CALL THE TRANSMISSIONEER**—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

**DODGE**

*of Mishawaka, Ind.*

# more information, please

**Use postcard to receive literature or details on new equipment and products reported in this issue.**

**THE LEAHY VIBRATING SCREEN WITH FLEX ELEX SCREEN HEATER** is set forth in a folder and data sheet released by *The Deister Concentrator Company, Inc.* The differential motion of the unit reportedly keeps meshes clear of intermediate-size wedging particles, and the heater keeps the wires warm and dry for uninterrupted production. **(301)**

**MINE AND UTILITY HOISTS** are described in a 20-page brochure available from *Vulcan Iron Works Company.* Among the units included are single- and double-drum electric hoists with rope pull from 1,000 to 50,000 lb; diesel and gasoline engine powered single drum hoists; low-speed, heavy-duty winch hoists; and automated small hoists. **(302)**

**"FLOAT YOUR TROUBLES AWAY,"** a movie showing the heavy media process for removing unsound or deleterious particles from gravel, is now available. Produced by *WEMCO,* a division of *Western Machinery Company,* it shows the theory, operation, and results obtainable in producing premium aggregate by the h.m.s. process. The movie is available for showing to all interested groups by writing WEMCO. **(303)**

**AN ECONOMY-PRICED FORK LIFT,** gasoline- or diesel-powered, that has been announced by the Industrial Division of the *J. I. Case Company* is described in a folder released by the company. Industrial Model 430 is available in a choice of three mast heights, with maximum lifts to 10½, 14¼, or 21½ ft. Lift capacity to maximum height in the first two stages is 4,000 lb. In the third stage, lift capacity is 2,500 lb. A number of accessories and optional equipment are available. **(304)**

**"$25,000 AWARD PROGRAM** for Progress in Arc Welded Design" is a brochure published by *The James F. Lincoln Arc Welding Foundation* to give details of their competition for welded designs of machines or structures. Examples of winning entries are illustrated. All papers must be mailed on or before July 17, 1961. **(305)**

**"QUALITY PRODUCTS FROM EIMCO"** is an illustrated listing of most major products of *The Eimco Corporation.* Among the lines included are tractor-loaders, mining equipment, and filtering equipment. **(306)**

**USING A SYMONS CONE CRUSHER** efficiently is explained in a booklet published by the *Nordberg Manufacturing Company.* Ratio of reduction, crusher speed, countershaft adjustment, lubrication, cold weather operation, and periods of inspection are some of the points emphasized. **(307)**

**TRUCK AND TRAILER SIZE AND WEIGHT RESTRICTIONS** for 1961 throughout the United States and Canada, including Alaska, are listed in a 66-page booklet published annually by *FWD Corporation.* **(308)**

**AUTOMATIC BLADE CONTROL** for LW motor graders as achieved by the Preco Dial-A-Slope is explained in an illustrated folder offered by the *LeTourneau-Westinghouse Company.* The electronic unit incorporates a photo-etched circuit, and is assembled in an electronic computer. A pendulum senses changes in the motor grader position and signals the computer. Solenoids actuate the power-control handle which raises and lowers the blade. The unit can be installed on any new or used current model LW grader. **(309)**

**THE MANUFACTURE OF GEARS AND POWER TRANSMISSION** at *Philadelphia Gear Corporation* is described and illustrated in a brochure published by the company. The variety of imported and special equipment used to achieve and check manufacture is set forth, and the steps in making the gears are given. Applications range from standard industrial gears to aircraft, marine, and space age equipment. **(310)**

**WEIGHING MATERIALS IN PROCESS** is explained and illustrated in a 10-page booklet released by *Industrial Physics and Electronics Company.* *(Continued)*

***JANUARY*** ***PIT AND QUARRY*** ***1961***

Insert key numbers found below items on advertising, literature, and new equipment pages. Print company name if not keyed.

Void after 60 days.

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# more information, please

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**SENSING AND CORRECTING TROUBLE IN MATERIAL HANDLING** processes, and applying corrective measures for belt conveyor junctions, sumps, bins, pumps, and chutes is covered in a 4-page folder released by the same company. **(311)**

**THE TOOL AND FABRICATION FACILITIES** at the plant of *Hardinge Manufacturing Company* are described in a 16-page bulletin published by the company. The modernization and expansion of the plant are demonstrated by a series of pictures. Departments shown include the foundry, which pours both "Meehanite" and "Ni-Hard" metal, specializing in "pit-molded" castings; the machine shops, which contain some of the largest tools in the area; the plate shop, which cuts, rolls, forms, and welds heavy-plate items as large as 10 ft. in diameter by 100 ft. in length; and the assembly department, which specializes in custom-made machinery. **(312)**

**REFRACTORIES**—raw materials used, mining of materials, quality control of the various processes—are described in a 16-page illustrated brochure released by *Harbison-Walker Refractories Company.* **(313)**

**INDUSTRIAL BUCKET ELEVATORS** for the handling of bulk materials are described in a 22-page booklet issued by *Hewitt-Robins Incorporated.* Capacities, maintenance requirements, belt selection procedures are among the subjects tabulated. Sections on trouble shooting and belt splicing are included. **(314)**

**COPIES OF A TALK ON ELECTROSTATIC PRECIPITATORS** made by Lester L. Nagel, chief electrical engineer, *Buell Engineering Co., Inc.*, are available from Buell upon request. The talk, presented at a seminar on electrical precipitation at Pennsylvania State University, covers what the plant engineer should know about the requirements of these units. **(315)**

**"HARD SURFACING AUSTENITIC MANGANESE** with Colmonoy® No. 1, Special No. 1 and Colmonoy No. 2," illustrated data sheets, covers typical uses of manganese steel, and the need for hard-surfacing. Also included are recommendations for application of the three alloys to improve wear resistance. These data sheets are available from the manufacturer, *Wall Colmonoy Corporation.* **(316)**

**MINING EQUIPMENT,** including crawler-mounted rotary drill rigs, Tracdrils, in-hole percussion drills, air-blast bits, diamond drills, sinker drills, demolition tools, portable compressors, and sump pumps are described and illustrated in a booklet published by *Chicago Pneumatic Tool Company.* Their newest developments are included. **(317)**

**SAF-T-BOOST INITIATOR,** a low cost primer initiator for ammonium nitrate-fuel blasting agents, is described in a sheet released by the manufacturer, the *Chemical Division of Chromalloy Corporation.* It is said to be safer than dynamite, easy to use, non-freezing, and it is Primacord sensitive. **(318)**

**SHOVELS, CRANES, DRAGLINES, PULLSHOVELS, AND LOADERS,** crawler, truck, and wagon mounted, are described in a pocket-size booklet published by *Baldwin-Lima-Hamilton Corporation.* Specifications and capacities are outlined in this roundup. A literature listing at the end permits the user to send for more detailed descriptions of various units. **(319)**

**COMPRESSORS AND AIR TOOLS** manufactured by the *Le Roi Division* of *Westinghouse Air Brake Company* are set forth in a newly released bulletin from Le Roi. Pictures, descriptions, and specifications are given for such units as a self-propelled blasthole drill, 25- to 100-hp. compressors, a dust collector, and line oilers. **(320)**

**Material listed here is FREE unless otherwise noted.**

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## NEW SUBSCRIPTION ORDER FORM

Send PIT AND QUARRY to me for

____One Year $3* ____Two Years $5 ____Three Years $6

____Payment enclosed ____Bill me ____Bill company

Name _____ Title _____

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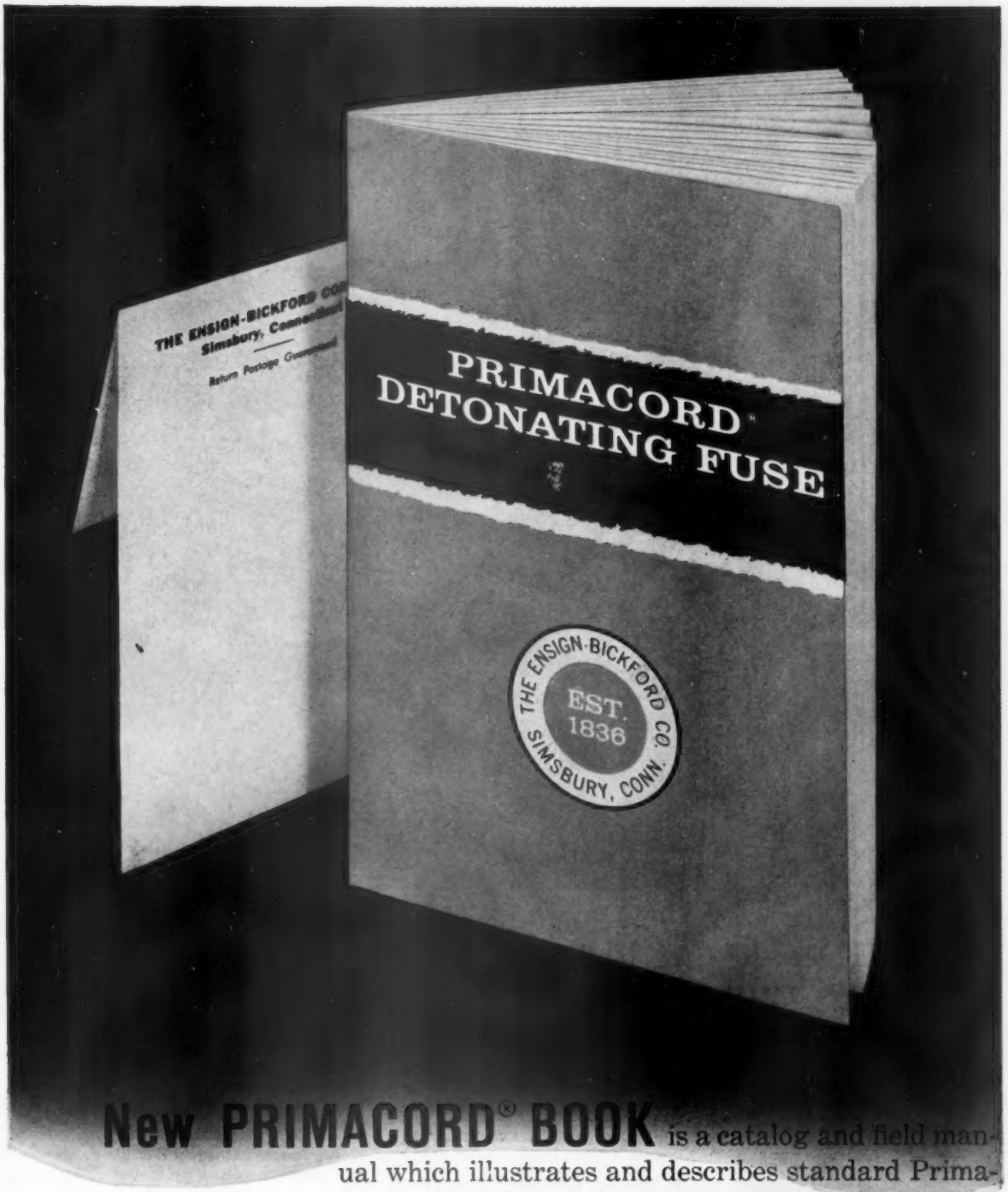
***U. S., U. S. Possessions, and Canada only.**
**Pan American countries, $10 a year; elsewhere, $15 a year.**




**New PRIMACORD® BOOK** is a catalog and field manual which illustrates and describes standard Primacord brands and tells how to use this detonating fuse to obtain better blasting with greater safety and profit—in mining, quarrying and construction work.

*Ask your explosives supplier for a free copy or write to Sales Department*

**THE ENSIGN-BICKFORD COMPANY**
**Simsbury, Connecticut** **Since 1836**

P-6

SPEED REDUCERS

CONVEYOR BELTING

VIBRATING EQUIPMENT

# Idler questions? H-R has the answers!

At last! A truly comprehensive book on belt conveyor idlers that answers *all* your questions. The new Hewitt-Robins "Belt Conveyor Idlers" book is one of the most complete ever offered to industry. In it you'll find:

- More than 80 helpful graphs, sketches, tables, charts; 150 illustrations; 48 pages of detailed information you can use.
- Comparison of ten competitive idler designs.
- Answers to questions frequently asked about idlers.
- Engineering information on belt speeds, conveyor capacities, idler spacing, and other factors you must consider in selecting idlers.
- Complete explanation of 14 basic types of idlers manufactured by H-R to fit every belt conveyor need.
- Tips on how to extend the life of idlers.

For your copy, consult your H-R representative, or write Hewitt-Robins, Stamford, Connecticut. Ask for Bulletin 1-24.

**HR HEWITT-ROBINS**

*The name that means everything in bulk materials handling systems...*

CONVEYOR BELTING AND IDLERS • INDUSTRIAL HOSE • VIBRATING FEEDERS, SCREENS & SHAKEOUTS • POWER TRANSMISSION EQUIPMENT

metal. When the shipment arrived the purchaser presented the bills of lading to the carrier and received three car loads of scrap iron worth only a fraction of $123,000.

The higher court refused to hold the carrier liable to the purchaser saying that a common carrier does not guarantee that transported merchandise is the same as specified in a bill of lading.

Other higher courts have held that either a bill of lading or warehouse receipt may specify valuable merchandise, but if the packages contain worthless instead of valuable merchandise neither the carrier nor the warehouseman can be held responsible, in absence of definite proof of negligence or intentional fraud.

### Damage Award Includes Everything

Recently a recent higher court in effect held that circumstances may arise under which a court will hold the owner of a quarry liable for all damages caused by his negligence. This decision answers a legal question presented by the operator of a quarry.

For example, in *Southeastern* v. *McCafferty,* 169 Fed. (2d) 1, it was shown that a person who was negligently injured sued for damages. When the jury returned the verdict it rendered a report holding the negligent company liable, as follows:

"We, the Jury find for the plaintiff: 'Doctor bill $195; Hospital bill $210; Loss of Work $600.50; Loss of car $1,000; Suffering $2,000; Permanent physical injuries $8,000. The total $12,005.50.' "

The higher court approved the verdict, saying

"There was substantial evidence that the negligence of (the) Company in failing to use due care to prevent the accident, was the proximate cause thereof."

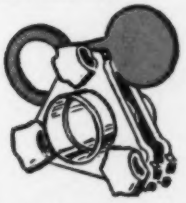
### Federal Taxes On Distribution

Another reader asked: "Is it necessary to pay income taxes to the United States government on paper income derived from debentures?"

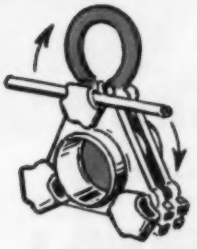
Generally speaking, federal income taxes need not be paid on a corporation's recapitalization. However, this rule of law is not appli-

***The easiest, quickest way to blind a cement line . . . with absolute shut-off***

Spool shaped nuts and bolts spread flanges when turned to the LEFT with bar.



Spectacle plate is reversed by lifting slightly and revolving in either direction.



Flanges are tightened by turning bolts to RIGHT.

# HAMER 3-BOLT LINE BLIND VALVE

There's no danger of contaminating different grades of cement when your silo loading lines and laterals are equipped with Hamer 3-Bolt Line Blind Valves. An absolute shut-off is obtained in just a few minutes by one man. By backing off three bolts with a bar the spectacle plate is ready to swing from open to closed position and you have a solid-plate, leakproof, shut-off. Hamer Line Blind Valves can't wedge, jam, or stick.

Use Hamer's on slurry or dry cement lines. They require minimum maintenance . . . are unsurpassed for positive action, easy operation, long-life, and resistance to abrasion. Ask your Hamer Valve specialist for complete information or write for latest catalog.

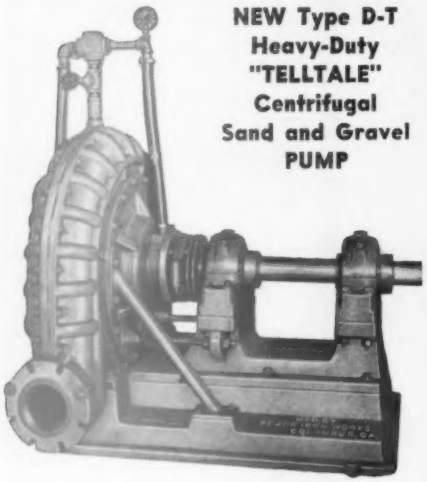
WECO® WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS
Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

HV-1-61

fmc

*Enter 187 on card, page 183*

# A PUMP UNCHOKES ITSELF AND KEEPS ON ROLLIN' ALONG



**NEW Type D-T Heavy-Duty "TELLTALE" Centrifugal Sand and Gravel PUMP**

"Another thing hard to believe is that whenever a plug blocks the line we are able to put on a few more RPMs and raise the pressure enough to blow it on through — which would happen with no other pump I ever owned."
So says Wilson Brisbois, American Stone Products, 6335 Sashabaw Road, Clarkston, Mich., reporting 175 to 200 cubic yards of sand and gravel per hour produced by his 8 x 10" Type D-T Heavy Duty "Telltale" Pump.

**AS LOW IN DOWNTIME AS IT IS HIGH IN PRODUCTION**

The useful and exclusive telltale feature is one of all the best retained in the latest "Telltale" pump, only type we now manufacture.
Some new features: New highs in production—new lows in downtime, because of simple foolproof assembly for changing parts—also "Telltale's" own.

Available with either tough semi-steel or best-in-the-long-run Ni-Hard wearing parts in 4", 6", 8", 6 x 8" suction and 8 x 10" suction. Now available also in either alloy, 45 and 90° extra-heavy long-radius flanged elbows. Write for Type D-T Heavy-Duty folder and prices.

## Pekor Iron Works, Inc.

*ESTABLISHED 1892*

LOCK DRAWER 909 FAIRFAX 2-4020 COLUMBUS, GEORGIA

*Enter 188-A on card, page 183*

# TRIAL SAMPLES

## *Of World-Famous WHITMORE'S Lubricants*

**OPEN CHAIN LUBRICANT INCREASES CHAIN LIFE UP TO 300%**

Penetrates, lubricates, prevents rust. Lubricates deep into chain linkage to reduce friction on pins, rollers, bushings, pressure surfaces. Corrosion inhibitor prevents rust in vital working mechanisms. Lubricates close-tolerance internal surfaces to increase chain life up to 300%. Highly recommended for all climatic conditions to stop rust and corrosion even in salt atmospheres.

Packaged in handy 16 oz. aerosol spray-on containers or in bulk — send for a free trial sample.

**ANTI-FRICTION COMPOSITIONS HAVE NO MELTING OR DROPPING POINT**

Packaged in 14½ oz. cartridges for handy application with lever-type cartridge guns for constant protection to roller, ball, sleeve bearings and sliding surfaces in "hot" bearing applications or in areas with high ambient heat. Exclusive formulas have no melting or dropping point; moisture resistant; will not wash out; exceptional metal adherence properties; temperature reducing qualities; high extreme pressure values. Available in two grades. Whitmore's Anti-Friction Composition No. 1 (light density), recommended for high speed, high temperature applications. Anti-Friction Composition No. 2 (heavy density), for low-speed high-temperature applications or loosely-fitted bearings. Specify No. when requesting free trial sample.

**68 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:**

- Open Gears, Dipper Sticks, Cams
- Open and Enclosed Chain
- Speed Reducers
- Enclosed Gear Cases
- Roller, Ball and Sleeve Bearings
- Wire Rope and Cable
- Hydraulic Units, Torque Converters

Est. 1893

**THE WHITMORE MANUFACTURING CO.**

LUBRICATING ENGINEERS

CLEVELAND 4, OHIO • VULCAN 3-7272

*Enter 188-B on card, page 183*


cable where an income is earned on distribution of debentures.

For illustration, in *Heady* v. *Commissioner of Internal Revenue,* 162 Fed. (2d) 699, the testimony showed that one Harvey was the principal stockholder in the Ready Mixed Concrete Corporation. Harvey died and later his wife could not sell his stock at a satisfactory price. Therefore, 1,000 new shares of par value of one dollar a share and $135,000 in 7 per cent debentures were issued in exchange of the old no-par value shares. A man named Date purchased from the wife the new shares on the installment basis.

In subsequent litigation, the higher court held that Harvey's estate realized taxable income from distribution of the debentures, notwithstanding that the distribution took the form of a recapitalization. Hence, federal income taxes were payable on this income.

### Can't Stop Present Operations

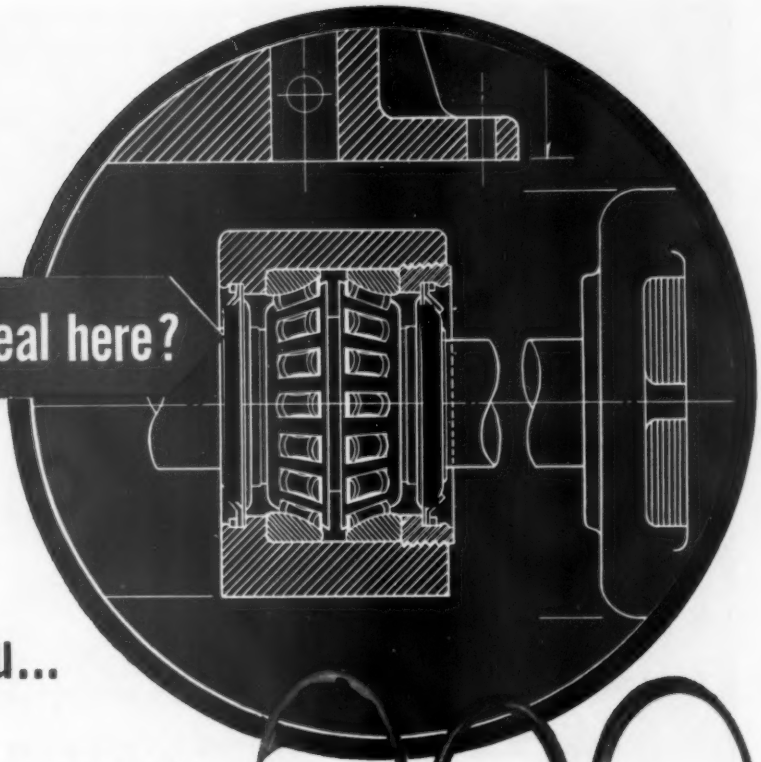
In answer to a legal question asked sometime ago by an official of a concrete block corporation, the writer recently located a leading higher court decision holding that a new state, county, or city zoning ordinance cannot stop or modify present operations of a plant which was in operation on the date the ordinance was enacted.

For example, in *Livingston Gravel Company* v. *City,* 260 Pac. (2d) 811, the testimony showed that a company has for several years operated a batching plant for the loading of ready-mix mixer trucks with concrete aggregates. Recently the county passed a new ordinance which prohibited this company from conducting the concrete mixing plant in this area. It was argued by the county officials that the plant is detrimental to public health and safety of citizens because many new residences were erected in this area.

The higher court held the ordinance invalid as to the company and said:

"Does the broad view of the police power which justifies the taking away of the right to engage in such businesses also justify the destruction of existing businesses? We do not think that it does. It is apparent that at the time plaintiffs

# what IS the best seal here?



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If long bearing life under adverse operating conditions is vital to your equipment, call your Shafer-Rex Engineer. In minutes he'll pool with your experience, years of Shafer know-how in dealing with every bearing sealing problem—grit and dust, liquids, chemicals and misalignment.

And, with the complete Shafer line available, you'll find it easy to select the right Shafer Bearing with just the right seals for your application. Shafer Seals were designed to protect Shafer Self-Aligning Roller Bearings and were developed after years of exhaustive research in Shafer laboratories—have been tried and proved in the field.

**FOR MOST CONDITIONS,** the Shafer "Z" Seal, the industry's only all-metal, fully self-aligning seal: self-aligning for positive sealing despite as much as 3° total shaft deflection; all-metal for maximum wear life.

**TO KEEP OUT LIQUIDS,** the "M" seal, designed exclusively for Shafer, is a contact lip-type seal of synthetic rubber. Self-aligning for positive sealing up to 3° total misalignment.

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**TO GIVE YOUR EQUIPMENT "PLUS" SALES APPEAL,** all Shafer Seals can be used in any style Shafer Housing, without housing modifications. In addition they are the only seals that can be easily removed for grease inspection without taking the bearing off the shaft.

**FOR ENGINEERING ASSISTANCE** on any application problem or for complete information on Shafer Self-Aligning Roller Bearings and Seals, write: CHAIN Belt Company, 4604 W. Greenfield Ave., Milwaukee 1, Wis. In Canada: CHAIN Belt (Canada) Ltd., 1181 Sheppard Ave., East, Toronto.

SHAFER-REX "Z" SEAL

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# From talc-like pulverants . . . to granulars . . .

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This wonderfully simple pneumatic hauler will unload a vast range of dry flowables with unusual efficiency. It's called Butler "P-D" (for pressure differential) and it absolutely thrives on hard-to-handle loads. You get fast, positive, 100 per cent clean-out every time. No special receiving equipment is needed . . . for either horizontal or vertical delivery.

Moreover, your shipments deliver worry-free in a Butler Pneumatic Trailer. The cylindrical shape saves weight, and it's the sturdiest and safest design yet developed for a pressure vessel. Careful automatic welding eliminates stress. Code and ICC safety factors are incorporated. And with no interior belts or liners to wear out, costly downtime is minimized.

Cement . . . gypsum . . . fertilizer . . . fly-ash . . . whatever you handle . . . it will pay you dividends to go bulk with Butler. We will be glad to advise you if your product can be readily delivered in a "P-D" trailer. And Butler also provides a full line of high-quality steel and aluminum transports for liquid hauling needs. Write direct to the Butler office nearest you for details.

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190


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(company) erected their plant, made their investment in equipping it, and commenced to use it, its operation was perfectly legal. It is likewise obvious that plaintiffs (company) had a vested property right in the operation of their plant of which they could not be constitutionally deprived."

### Law of Blasting

A few days ago a quarry owner wrote asking for the law on blasting liability, when nearby homes are damaged.

A review of late and leading higher court decisions discloses that generally the owner of a quarry, or other blaster, is liable for any and all damages affecting adjacent property owners as a result of explosions which cause rock or debris to fly through the air.

For example, in *Beecher* v. *Dull,* 143 A. 498, it was shown that a quarry owner blasted by a process of "mud capping." This operation resulted in considerable vibration and noise, and also threw pieces of broken stone onto surrounding property and houses, the owners of which sued to recover damages.

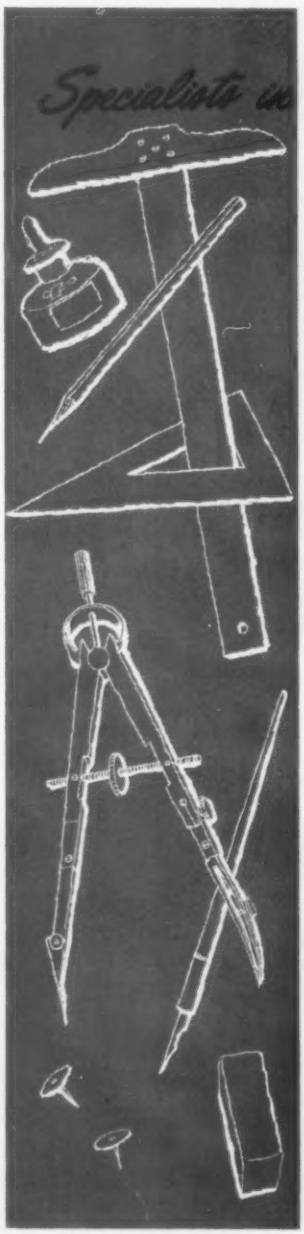
The quarry owner attempted to avoid liability on the contention that its employees had exercised great care in preparing the blasts and that property owners could not recover unless they proved that the damages were negligently effected. Notwithstanding this argument, the court held the quarry owner liable, saying:

"The decided weight of authority supports the view that where one explodes blasts on his own land and thereby throws rocks, earth, or debris on the premises of his neighbor, he commits a trespass and is answerable for the damage caused, irrespective of whether the blasting is negligently done."

Therefore, the law is generally but not consistently established that blasting operations which cast flying rock, debris, etc., upon another's land is "trespass" for which the blaster always is liable. The higher courts in some states have held this same law not applicable where private property or homes are damaged from blasting operations which vibrate the ground and produce concussions. One line of higher court cases holds that even in the absence of negligence a company engaged in blasting is liable for damages caused by vibration and concussion. Another line of higher court cases in other states, holds exactly the opposite. These two lines of authority are discussed in 22 Am. Jr. 180, and 35 C.J.S. Explosives, 8, p. 238. For a full discussion of the law in different states see the annotation in 92 A.L.R. 741; *Holden* v. *Carmean,* 178 Ark. 375, 10 S. W. (2d) 265. This late higher court clearly explains the varied law in the different states on this subject.

On the other hand, it is important to know that all higher courts agree that any and all corporations which perform blasting are liable in damages for injuries caused by negligent blasting operations.

For illustration, in *Benton Gravel Company* v. *Wright,* 175 S. W. (2d) 208, the owner of a dwelling sued a gravel company to recover for damages to his home. He proved that the company, in remov-

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High Capacities of clean materials
Developed from the world's first all-steel log washers built by McLanahan & Stone in 1894, these machines produce high tonnages of exceptionally clean materials—removing tough clay, soft rock and refuse with unequalled speed and economy • Available in Washmaster and Mudmaster styles.
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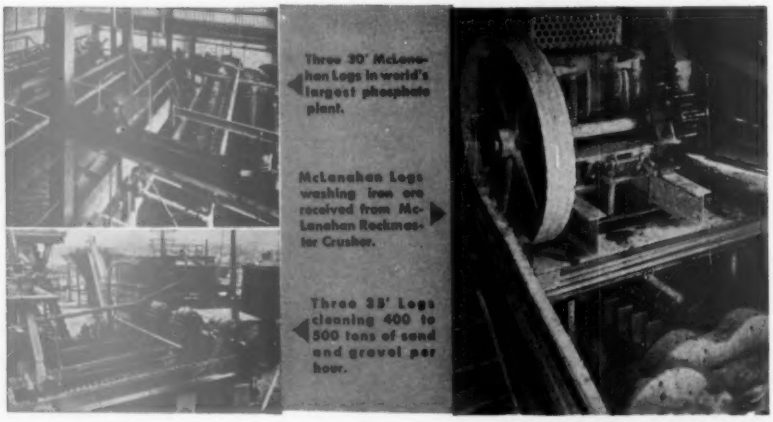
Three 30' McLanahan Logs in world's largest phosphate plant.
McLanahan Logs washing iron ore received from McLanahan Rockmaster Crusher.
Three 25' Logs cleaning 400 to 500 tons of sand and gravel per hour.
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ing gravel from its nearby land, used dynamite in blasting and caused his well to go dry. Also, because of the blasting the house was shaken on its foundation, and cracked.

The important question presented to the jury was whether the gravel company should be compelled to pay the full damages caused this property. This higher court held:

"If the injuries were temporary, then the rule would be that where the injury to real property is temporary, the measure of damages, in a case like this one, is the cost of restoration to condition prior to the injury plus decreased rental value from the time of injury to the time of award for restoration. . . . The question of whether the injuries were t e m p o r a r y or permanent should have been submitted to the jury."

For comparison see *Kennedy* v. *General Company*, 213 S. W. (2d) 707. Here it was shown that a property owned sued a company for damages. The property owner alleged that dynamite charges within 10 feet of his land shook his ground and caused "annoying vibrations" of the air. The court refused to hold the company liable, saying:

"There was no evidence that appelant (property owner) suffered any physical damage to his land by reason of the shooting near his land."

Also, see *Bessemer* v. *Doak*, 44 So. 627, decided by a higher court in Alabama. This court upheld the usual rule that if a company in blasting invades nearby premises by throwing stones and debris thereon, the company is liable for the resulting injury. However, this court also held that for any other injury, such as may result from the mere concussion of the atmosphere, sound or otherwise, there is no liability unless it is shown that the injury was the result of negligence, and not the result of blasting according to usual methods and with reasonable care.

### Employee Suffers Two Injuries

A few weeks ago a higher court held that if an employee suffers a second injury after returning to work after the original injury, his compensation under the State Workmen's Compensation Act will be increased accordingly.

For instance, in *Welcox v. Alison,* 350 Pac. (2d) 41, it was shown that an employee sustained an injury to his back when working for his employer. An operation was performed, and after several months the employee returned to work. Soon afterward, while he was lifting rock and performing other work, he injured his back again.

The higher court increased his compensation of 25 percent, based upon his original injury, to 35 percent, based upon his second disability.

---

### New Careers Booklet Published In Mineral Engineering Field

The Society of Mining Engineers of A.I.M.E. have published a new careers booklet for prospective students in mineral engineering. The keynote of *Careers in Mineral Engineering* is the unlimited opportunity in the field for students who have the aptitude and ambition to pursue such a career.

The booklet points out that the growing population of the United States requires constantly expanding production of mineral commodities. Copies of this booklet may be obtained from the society at 29 West 39th St., New York 18, N.Y.

### 75th Anniversary Celebrated By The Ruberoid Company

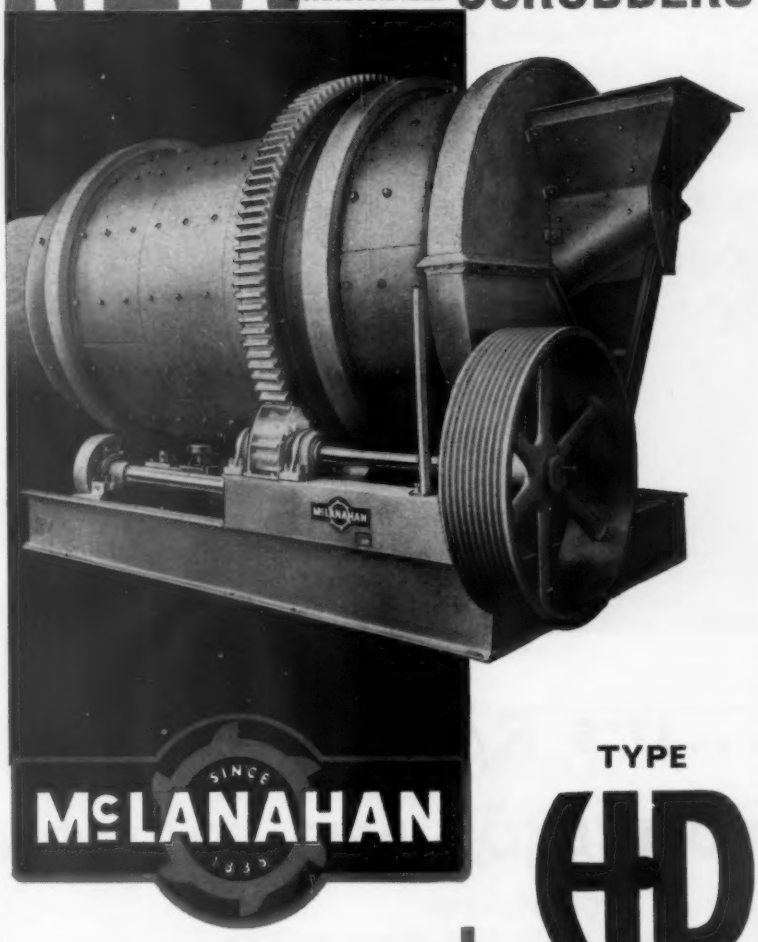
A full week in October was devoted to ceremonies at 20 Ruberoid Company plant locations throughout the United States, marking the 74th anniversary of Ruberoid's founding. This large producer of building and industrial products began doing business on October 20, 1886.

Special recognition was given members of the Ruberoid Twenty-Fivers, an honorary service organization composed of employees with 25 years or more of service.

---

Earl T. Andrews, vice-president of the Pennsylvania Glass Sand Corporation, Hancock, W. Va., has been elected director of district 6 of the American Society of Civil Engineers. The district encompasses the Pittsburgh, Maryland, Virginia, and West Virginia areas of A.S.C.E.


NEW HIGH-CAPACITY STANDARDIZED SCRUBBERS



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TYPE HD HEAVY DUTY

With capacities from 60 to 250 tph, Scrubbers in this new series are ruggedly constructed and designed for excellent results with a minimum of water, power and maintenance. Specify McLanahan H-D Heavy Duty Scrubbers for efficient removal of dirt, loam, light clays, soft rock and similar materials from sand, gravel, crushed stones and ores.

*Ask for New Bulletin HDS-70*

- Optional desander for separating fine and coarse materials.
- Renewable tires on drum, trunnions and thrust rollers.
- Cut gears . . . Abrasive-resistant liners . . . Perfect concentricity of drum, tires and gear.

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HOLLIDAYSBURG, PENNSYLVANIA
*Pit, Mine and Quarry Equipment Headquarters Since 1835*

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# 40 STORIES *from Pit to Surface*

## ...IT'S R/M

## CONVEYOR BELT FOR LONG LIFTS!

Easy troughability, flexibility, super-strength synthetic cords, high wear-resistance—make R/M Conveyor Belts ideal wherever long lifts at high tensions are required. The installation shown here, for example, was a quarter-mile conveyor with a lift from pit to surface loading station nearly as high as a 40 story building. An R/M conveyor belt made an exceptional record on this rugged haul. There's an R/M heavy duty conveyor belt for every materials handling requirement . . . each engineered to haul fuller, heavier loads—and *last longer*. With proper engineering, for example, you can increase hauling capacity up to 60% with Ray-Man Conveyor Belt and 45° idlers! Ask your R/M representative about other R/M Conveyor and elevator belts, about advantages of extra-flexible, double compensated, rip-resistant Ray-Man . . . about Homocord, the extra-cushioned belt for unusually abusive shock loading conditions, or about the Wedlok metal fastener splice which avoids vulcanizing splices. Any R/M Conveyor Belt with "XDC" cover means extraordinary resistance to wear and tear, longer life—"More Use per Dollar." Write for Bulletin M302 and Catalog CB25.

*ENGINEERED RUBBER PRODUCTS ... "MORE USE PER DOLLAR"*

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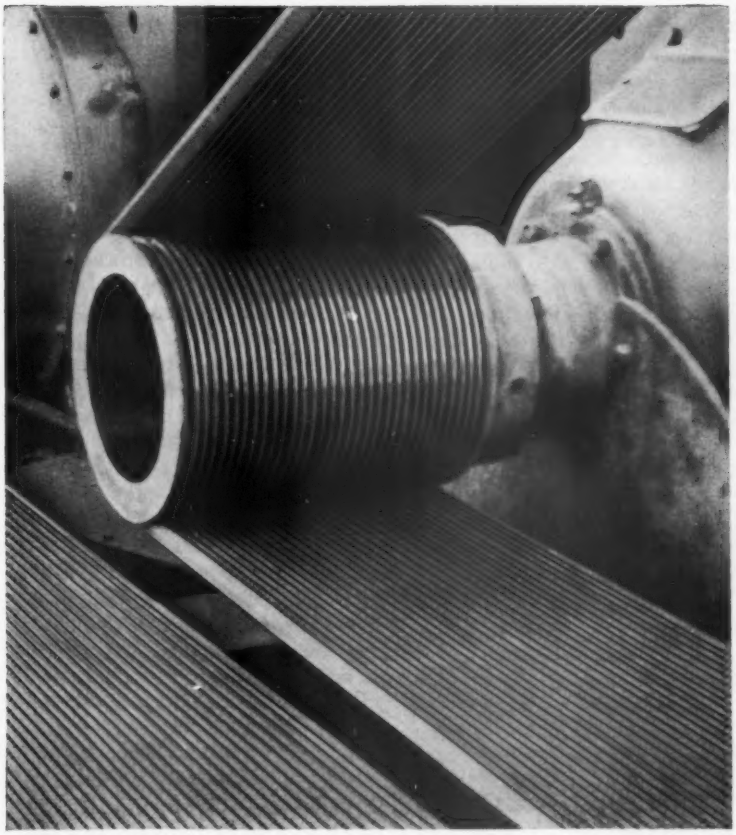
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

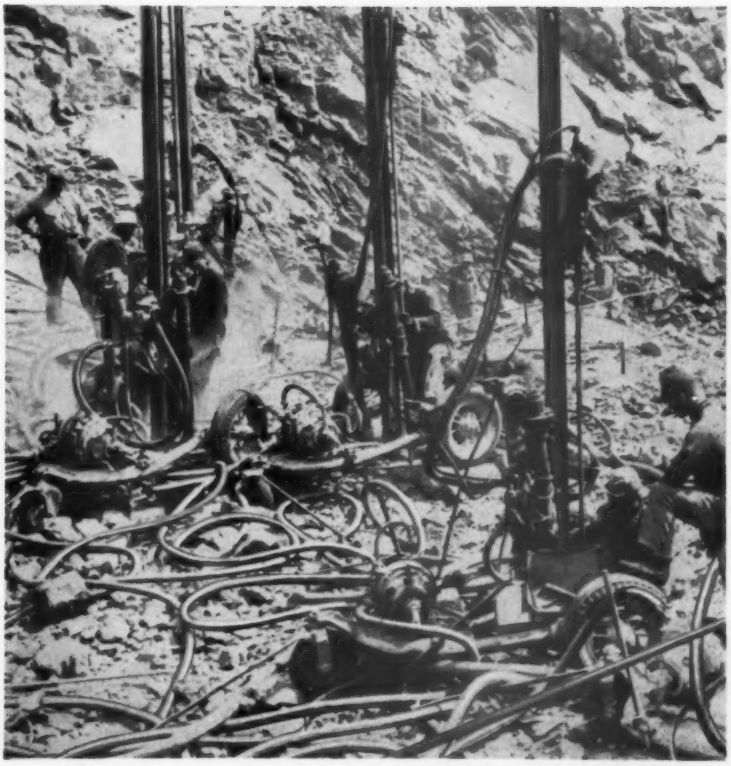


## R/M POLY-V® DRIVE

### *More* Power— in *Less* Space ... *with Reliability*

A *single unit* V-ribbed belt across full width of the drive-sheave—*not* an assembly of V-belts—enables patented Poly-V to deliver much *more* power in the same space as a V-drive . . . or *equal* power in much *less* space! Single unit belt design also eliminates belt "length matching" problems ... minimizes equipment down-time and belt replacement costs. Belt speed ratios remain constant from *no* load to *full* load to provide the smoothest running, coolest running—*longest wearing* drive you can install. Maintain groove shape. Just two sections of Poly-V Belt meet every heavy duty power transmission requirement. Write for Bulletin M141, or call your R/M Distributor.

***CONVERT TO RM POLY-V and BE SURE!***



## HOMOFLEX HOSE *more flexible, weighs less than any hose for equal pressure*

- **SUPER-STRONG**
- **PRECISION BUILT**
- **NO PRE-SET TWIST—WILL NOT KINK**
- **INSEPARABLE TUBE-TO-COVER BOND**
- **UNIFORM INSIDE AND OUTSIDE DIAMETERS**
- **EASIER, SAFER COUPLING**

Strong, lightweight, and "flexible as a rope"—Homoflex is the easiest handling hose and lasts longer. Made in types for air, water, other fluids and gases. Ask about other types of R/M rubber hose for your job applications. Write for Bulletins M620 and M694.

guarded against. A special steam-hydration after-process can be designed into the process, if needed, as a modern substitute for the practice of clinker "aging" sometimes employed in the past.

These low-lime silicate cements may, in some cases, turn out to be fast setting and slow hardening. In the lime-silicate plant operation, they may be modified by interblending with one or more of the other products manufactured, or by addition of certain set-controllers and strength-accelerators, such as soluble anhydrites of calcium, calcium chloride, alkalies, aluminates, or various seeds. Processed under modern control and pyro-processing techniques, such cement is distinguished for its chemical inertness and toughness, low heat of hydration, eventual high strength, and potentially lower cost.

Summarizing and reviewing, then, the distinguishing features of the cements here briefly discussed, let us recall that in the case of hydraulic lime, and also silicate cement, there are produced directly hydratable lime-silicate-aluminate cementing compounds (not necessarily pozzolanic), while in the case of pozzolan cements the lime component is not combined with the reactive silicate components. Thus the hydrolysis of the cementing compounds in pozzolanic cements is preceded by chemical combination (ionic interchange) by way of an aqueous solution mechanism in the user's hands, rather than by a fluxing and solid diffusion mechanism at an elevated temperature in the producer's hands.

## MULTIPURPOSE PROCESSING PROVISIONS

Figure 2 (see page 154) presents a simplified flow-sheet showing how various process steps can be integrated into the design of a single multiproduct lime-silicate plant operation utilizing clay and limestone, for example, for raw materials. Note that all material passes through the common primary crushing-and-screening department. Several finished products are available at this point, particularly the heavy aggregates, which may be hard limestone or vitrified clinker; the latter finds a market in isolated soft rock regions.

In addition to these finished products, this primary operation also furnishes sized shale for the bloating or expansion process, and sized limestone for lime burning.

A secondary pulverizing and classifying operation or system, (with or without drying) represents another take-off from the primary process station. This furnishes either finished pulverized raw material products or prepares a blended two-component material for further processing. Material of the latter type is subsequently proportioned, mixed, and formed into suitable kiln feed for pyro-processing. Soft undersize shale fractions and dust can thus be reclaimed and utilized as kiln feed. Limestone can be added to nonbloating clay for heat expanding at this two-component mixing station, or for silicate cement clinker burning through the same equipment.

All heating and cooling is channeled successively through one or more multiprocess rotary kilns and coolers, and then conveyed to open ground and covered storage. Expanded clinker is stored in the open, quicklime and hydraulic quicklime in silos, and pozzolan and silicate cement clinker in sheds. From this point on the circuit is self-explanatory, as the variously burned materials are routed through an integrated grinding, classifying, and blending circuit system.

While this flow diagram might be considered typical for the raw materials and products used here, as an example, there will naturally be numerous variations possible from this design, some simpler and some a good deal more involved. Basic to all, nevertheless, is the shared and maximum use of single equipment and systems for various materials and processes.

---

The Southwest Potash Corporation, Vicksburg, Miss., recently held ground-breaking ceremonies for its new $7 million dollar plant.


HAYWARD CLAMSHELL BUCKETS

WORK LONGER,
WORK FASTER,
WEAR LESS!

Designed with rugged, one-piece alloy shells ... wide type, cast manganese steel cutting edges... smooth shell interior for fast, capacity loads and easy discharge ... manganese bushings... diagonal truss brace to keep shell in line... has no side sway or back lash... *plus many other cost-cutting design features!*

Get complete details. Write today for illustrated bulletin.

THE HAYWARD COMPANY

50 CHURCH STREET, DEP'T P, NEW YORK 7, N. Y.

*Builders of Better Buckets Since 1888*

*Enter 196 on card, page 183*

# Manufacturers' News

DUDLEY B. SMITH, manager of foreign licensing for Clupak, Incorporated, New York, N. Y., has been elected secretary of the corporation. This announcement was made by G. E. AMERMAN, president, following the resignation of JAMES F. HALEY, secretary of Cluett, Peabody & Company, Inc., who has held the position of secretary of both corporations.

Mr. Smith has peen associated with the Clupak extensible paper project since 1955 when he was patent counsel for Cluett, Peabody & Co., Inc., (Cluett, Peabody is one of the two stockholders of Clupak, Inc.)

ALFRED S. HARRIES has been appointed refractories sales representative for the Pittsburgh, Pa., district sales office of The Babcock & Wilcox Company. Prior to his new post he served as refractories sales representative for six years in the company's New York sales office.

Mr. Harries has been associated with B&W since 1933 when he joined the company's Augusta, Ga., refractories plant as an apprentice brickmason. In addition to manufacturing experience, he has supervised refractories installations throughout the United States as well as the construction of kilns in England.

JOHN CHAHBANDOUR has been appointed a partner of Nelson Engineering Sales Company, Pittsburgh, Pa., sales representative for The W. W. Sly Manufacturing Company, Cleveland, Ohio. The Pittsburgh firm, headed by ROLAND E. NELSON, has offices at 524 Grant Building.

Mr. Chahbandour will provide sales and application engineering for Sly dust control systems, industrial ovens, blast cleaning equipment, and tumbling mills. For the last six years, he was sales manager of the Carrier Conveyor Division, Chain Belt Company, Louisville, Ky.

STEVE G. SUTTON has been appointed manager of public relations, The Jeffrey Manufacturing Company, Columbus, O. He succeeds L. H. MCREYNOLDS, advertising

S. G. Sutton

L. H. McReynolds

manager, who is retiring after 40 years service.

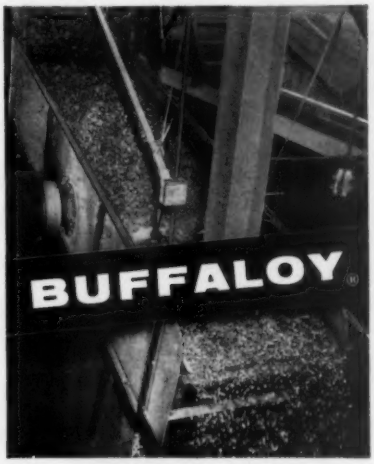
Mr. Sutton was with the sales department of Monsanto Chemical Company before joining Jeffrey in 1957. He has been assistant manager of distributor sales for the past two years.

Mr. McReynolds has been advertising manager since 1953. He was director and past president of the local chapter of the Association of Industrial Advertisers.

The National Filter Media Corporation, New Haven, Conn., and Salt Lake City, Utah, has announced the addition of ROBERT J. FITZGERALD to its staff. He will be responsible for the company's activities in industrial dust collection, and in his capacity as a dust control engineer, he will be their representative in the Air Pollution Control Association. Mr. Fitzgerald was formerly with the Entoleter Division of Safety Industries.

ERNEST W. NEBEN has been appointed to an executive management position with WEMCO, a division of Western Machinery Company. Mr. Neben, a registered professional engineer, brings to his new assignment a background of 20 years engineering and sales experience in the processing equipment field.


LONGEST SERVICE AT
LOWEST COST PER TON




anti-abrasive wire cloth

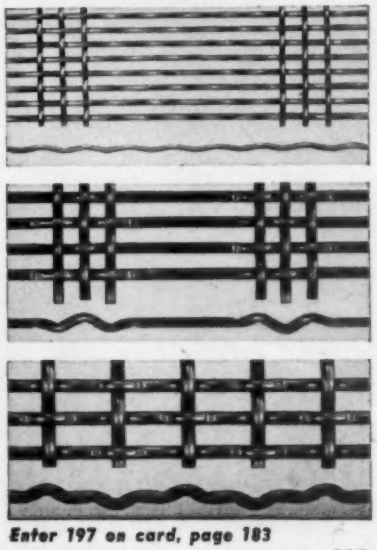
Here's the toughest mineral aggregate screen in the business . . . outperforming and outlasting screens that cost appreciably more. Specially processed for greatest resistance to wear, Buffaloy has both the hardness to hold up under severe abrasives and the flexibility to shrug off heavy shock loads.

Count on Buffaloy for many extra hours of service and substantial savings in your screening operations. Vastly superior to other high carbon wire screens, it is made in two grades:
Regular . . . for average conditions.
Super . . . . for highly abrasive materials.

Now available in an extra wide selection of weaves, mesh sizes and gauges — either as flat pieces or vibrator screen panels with special edges — Buffaloy can answer your every sizing need.

Get the complete story on Buffaloy and what it can do for you. Write for New Bulletin 600P.

BUFFALO WIRE WORKS COMPANY, INC.
526 Terrace, Buffalo 2, N. Y.



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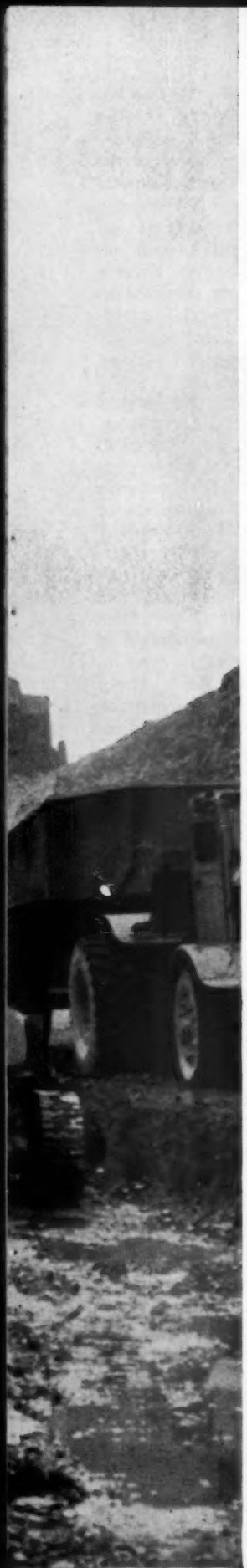
MAUMEE COLLIERIES



At the Maumee Collieries in Indiana...

# ANACONDA SHOVEL CABLE HAS A RECORD: 10 YEARS ON THE ROCK PILE!

## Anaconda's SH-D Cable gives many years of dependable service in spite of heat, moisture, kinks, rocks and runovers!

How many shovel cable hazards can you count in this picture from the Maumee Collieries? Rocks . . . moisture . . . kinks . . . danger of runovers—they're all there. Yet the first installation of Anaconda's rugged SH-D Shovel Cable has resisted them all—*for 10 long years!*

It's proof again of the way Anaconda's in-the-field experience with Shovel Cable pays off in a superior cable for you. The important knowledge gained from use and testing of SH-D Cable *on the job* in our own mines goes into the design and manufacture of Anaconda Shovel Cable.

For example, the insulation is Anaconda Butyl (AB). Nothing can beat it for withstanding ozone, heat and moisture. Patented rubber cores cushion the ground wires and help prevent breaks from kinks and runovers. SH-D has a neoprene jacket that is exceptionally tough and abrasion-resistant. And every design, every component has been job-tested—your assurance of superior quality and performance.

Call on the Man from Anaconda with your cable problems. Or see your local Anaconda distributor. For new descriptive Bulletin DM-5818, "Anaconda Securityflex Portable Cables for the Mining Industry," write: Anaconda Wire & Cable Co., 25 Broadway, New York 4, New York.

50212

◀ For a decade, the Anaconda SH-D Shovel Cable you see here has been giving dependable service for the Maumee Collieries, Jasonville, Indiana. Its many superior design features enable it to resist on-the-job hazards that would knock out ordinary shovel cables.

ASK THE MAN FROM

# ANACONDA®

FOR **SHOVEL CABLE**

*Enter 198 on card, page 183*

An enlargement of territory for one of its crane-excavator distributors, The ZECO Company, Minneapolis, Minn., has been announced by Bucyrus-Erie Company.

ZECO will add a 21-county area in west central Wisconsin to its Minnesota territory. In Minnesota, however, the distributor will relinquish 10 northeastern counties. The distributor's main office and shop facilities are located at 2929 University Ave., S. E., Minneapolis 14, Minn.

Dalworth Machinery Company, 10301 Shady Trail, Dallas, Texas, has been appointed dealer for P&H construction and mining products manufactured by Harnischfeger Corporation, Milwaukee, Wis. The new dealership will cover a territory including 68 counties in north-central Texas.

L. C. FULLER is president of Dalworth Machinery Company; B. P. WOODY, vice-president and sales manager; JOE CARTER, service manager; and CLYDE HITT, parts.

S. W. White Jr.

SAMUEL W. WHITE JR. has been named president of the Oliver Corporation, Chicago-headquartered firm which recently became the farm and industrial equipment subsidiary of The White Motor Company, Cleveland, Ohio.

Mr. White has been president of Oliver International, S.A., the company's foreign division, since 1957 and also was elected executive vice-president of The Oliver Corporation shortly before the firm completed its transaction with White Motor.

Mr. White will direct the operations of the new White Motor subsidiary in the manufacture and distribution of all Oliver farm equipment and the distribution of Oliver crawler tractors and other industrial equipment. White Motor has a two-year option on acquisition of Oliver's crawler tractor and industrial equipment facilities.

The new Oliver Corporation president is not related to the White family which founded The White Motor Company. Mr. White joined Oliver as a plant trainee in 1939.

LEE ZOECKLER has been appointed manager of sales and product training of the Permaglas Division of A. O. Smith Corporation, Kankakee, Ill. Other company posts held by Mr. Zoeckler are sales supervisor in Chicago, and sales representative in Michigan, Indiana, and Wisconsin. His affiliation with A. O. Smith began in 1950. Mr. Zoeckler has held a variety of executive, engineering, and administrative posts in the heating and ventilating field.

Nienberg Supply Company, P.O. Box 26, Glandorf, Ohio, is a new distributor for the NEW LEADER line of Highway Equipment Company, Cedar Rapids, Iowa. Territory served includes counties of Williams, Defiance, Paulding, Van Wert, Fulton, Henry, Putnam, Allen, Lucas, Wood, Hancock, and Ottawa in the state of Ohio; the counties of Hillsdale, Lenawee, and Monroe in the state of Michigan.

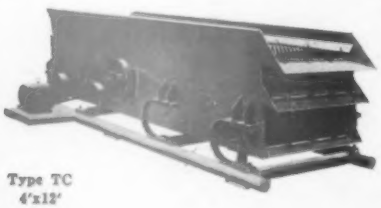
# 4'x12' KOLMAN Triple-Deck Screen Handles 120 Tons an Hour

Making specification aggregate in Southern Kansas calls for screening large volumes of fine material. When Mr. George Myers of Myers Materials, Inc. installed his new washing plant at Arkansas City, Kansas to produce concrete sand, engine sand and mason sand, his operation demanded a vibrating screen capable of handling fines effectively. His choice — a Model TC-120-48 KOLMAN Triple Deck Screen 12' long x 48" wide.

This high speed, vigorous action screen has proved itself fully capable of the rugged assignment. It receives material from the 8" pump at an average rate of 120-130 TPH. Everything under 2" hits the ¾" square opening screen cloth on the top deck, where less than 5% of the feed is removed. For certain specifications, a No. 4 screen is used on the middle deck.

But frequently the center screen is not used, and the full load of minus ¾" goes directly to the 6 mesh oblong opening bottom screen. Here 40% to 50% of the 120-130 TPH feed must pass, with a very minimum of carryover. Ralph Bridges, Plant Manager and John Bucher, Plant Superintendent, report that their KOLMAN Screen takes care of this separation beautifully. With slots running crosswise, the rapid, sharp stroke of the KOLMAN eliminates blinding on the 6 mesh screen in spite of the great amount of oversize on the deck and even in the most difficult areas of the pit.

KOLMAN Screens are designed for a wide variety of applications, including the toughest washing and crushing jobs as well as the light weight portable plant installations. Your KOLMAN dealer will be glad to provide you with complete data and the names of owners in your locality.



Type TC
4'x12'

WRITE FOR LITERATURE AND PRICES

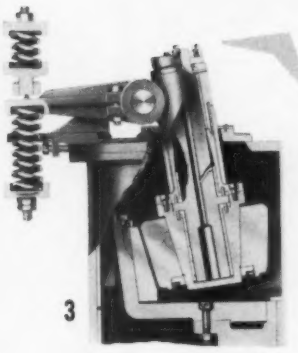
**KOLMAN MANUFACTURING CO.**

4800 W. 12th St. Sioux Falls, S. D.

*Enter 200 on card, page 183*

# RAYMOND BOWL MILLS

1



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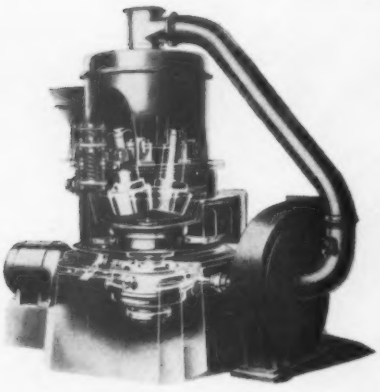
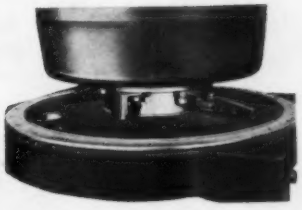
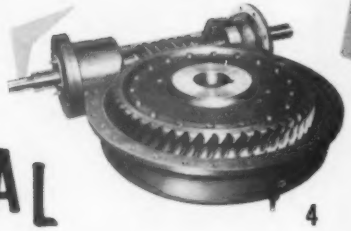




2

## almost PERPETUAL MOTION...



4

**THE CONTINUOUS, ROUND THE CLOCK, OPERATION OF RAYMOND BOWL MILLS BORDERS ON PERFECT AUTOMATION.**

Capacities of over 18 million tons annually, with 390 units in use on kiln firing alone, is the record set by Raymond Bowl Mills in the handling of coal . . . any grade or moisture content.

Bowl Mills have high availability and wide range capacity.

Flexible control of a noiseless and dustless operation with low maintenance is assured.

Widespread application has been made on rotary kilns for Cement, Lime, Dolomite and other products. Kilns provide increased production, superior product quality, lesser fuel costs and maximum burning efficiency with overall operating economy.

These important parts are largely responsible for maintaining the constant, smooth, highly efficient performance of the Mill.

1. The Revolving Bowl directs the coal between the rolls and the grinding ring by centrifugal force, providing maximum grinding efficiency with minimum load of unground material.

2. Tramp Iron, Pyrite, Slate and other foreign materials are automatically and continuously removed from the mill through the Reject Spout.

3. The Journal Assembly has trunnion and spring pressure mechanism for adjustment of grinding pressure between roll and bull ring. The sliding saddle on top plate is adjustable from outside to align roll and compensate for any wear.

4. A precision built Worm Gear Drive that runs in a bath of oil, giving a smooth, quiet, vibrationless operation.

The Bowl Mill is a rigidly constructed, proven machine with a renowned record of performance, backed by an organization with over a half-century of experience in manufacturing pulverizing equipment.

**Having a MILL under finger-tip control with day in and day out operation that approaches perfection is practically like having Perpetual Motion.**

**FOR DETAILS SEND FOR RAYMOND BOWL MILLS CATALOG 75 Q**

**COMBUSTION ENGINEERING, INC.**

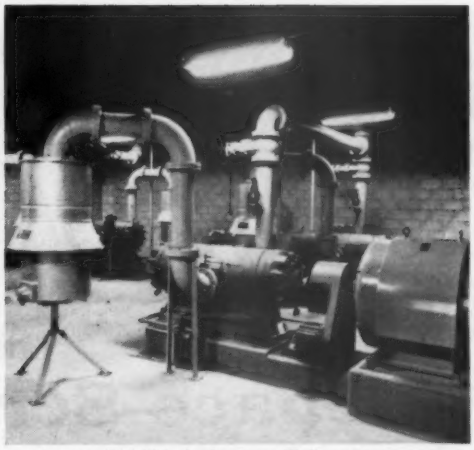
427 W. Randolph St.
Chicago 6, Illinois

*Raymond Division*

Combustion Engineering-Superheater Ltd., Montreal, Canada

PRINCIPAL CITIES SALES OFFICES IN

# FULLER MATERIALS HANDLING EQUIPMENT HELPS CEMENT PLANT TRIPLE CAPACITY



Group of C-300 single stage Fuller rotary compressors furnishing air for the Fuller-Kinyon pumps in raw-finish department.

Two 10″ Fuller-Kinyon pumps in raw mill pumping material to blending silos.

F-H Airslide Conveyor under new finished cement silos feeding to Fuller-Kinyon pump for redistribution.

One of three Fuller Inclined Grate Coolers in kiln building.

Automation with a variety of Fuller equipment at Lehigh Portland Cement Company's Union Bridge, Maryland plant has helped triple capacity from 1,000,000 to 3,000,000 barrels a year.

In this installation, Fuller-Kinyon pumps handle both cement raw material and finished cement to and from process.

Fuller rotary compressors furnish air for both the Fuller-Kinyon pumps and general plant air.

Airslide® Fluidizing Conveyors are used at various stages of both the raw and finished mill operations in feeding both raw material and finished cement to and from process and storage.

Clinker is discharged from three 400′ kilns and cooled to about 145°F. by three Fuller 7′ x 44′ Inclined Grate Coolers.

This wide range of Fuller systems and equipment in the field of pneumatic handling makes it possible for Fuller to find the method of moving dry bulk granular materials best suited to your particular application. Why not write for complete details today? 1324 G-198-T

FULLER COMPANY GENERAL AMERICAN TRADE MARK

**FULLER COMPANY**
**100 Bridge St., Catasauqua, Pa.**
Subsidiary of General American Transportation Corporation
Offices in Principal Cities throughout the World
*See Chemical Engineering Catalog for details and specifications.*

**Fuller**
....pioneers in harnessing AIR

MAXIMUM THROUGHPUT — CF&I Space Screens with Rectangular Openings have high percentage of open area, provide considerable freedom from blinding and clogging.

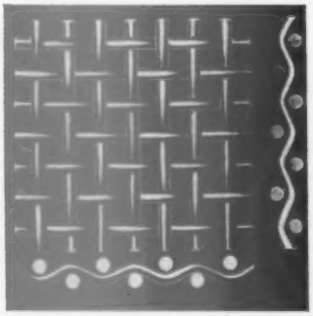
FREEDOM FROM CLOGGING AND BLINDING — The greater open area of CF&I Long Slot Space Screens, plus intense vibration of wires on the long sides of openings, prevents material build up.

# You get selectivity with CF&I Space Screens

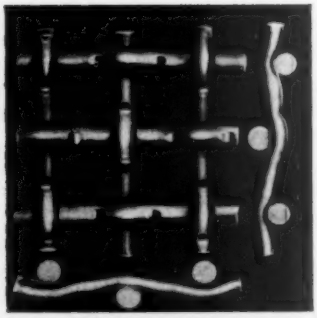
Whether you want high throughput, maximum accuracy or long service life, there's a CF&I Space Screen that will give you the results you're looking for. You can choose from screens with almost any combination of openings, weaves and crimps, edge preparations and effective open areas. CF&I has the experience and facilities — as symbolized by our Corporate Image — to supply screens to meet your most exacting requirements.

All CF&I Screens are available in a complete range of metals including carbon, alloy and stainless steels, aluminum, bronze, Monel and many other alloys. For further information on the screens described here or on any in the CF&I line, contact a local CF&I sales office.

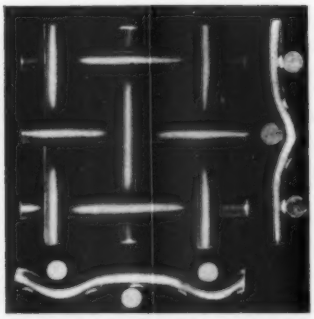
7726



LONG LIFE — Even under severest operating conditions Double Crimp cloth is most effective. That's because it's built so all wires get equal wear.



VERY ACCURATE SIZING — Because each wire of Lock Mesh Cloth is constructed in a "locked-in" position, it's one of the best available for vibrators and trommels.



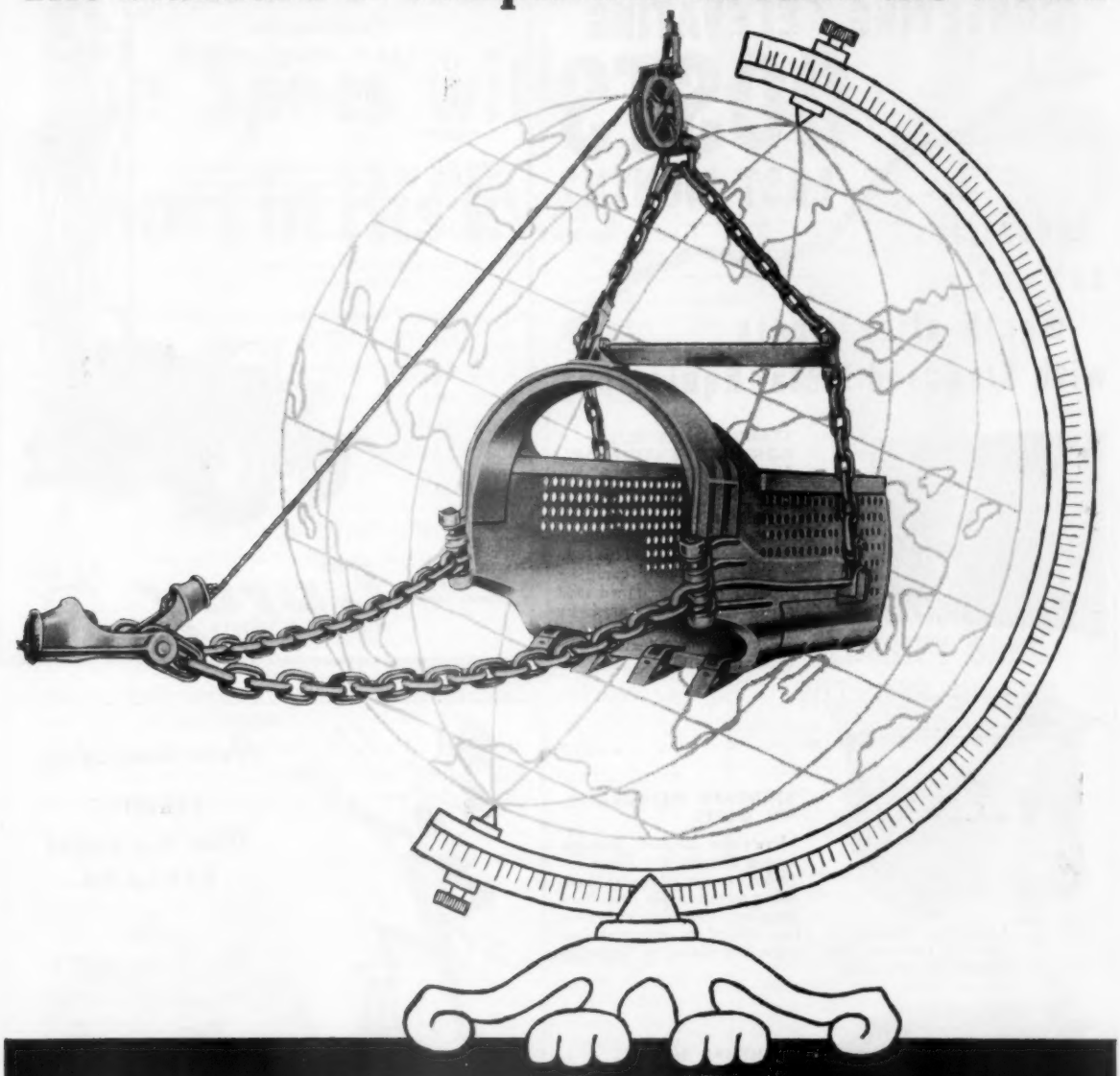
MINIMUM RESISTANCE TO MATERIAL FLOW — With all the crimping on the underside, CF&I Space Screens with Flat Weave set up minimum turbulance to materials going through.

## CF&I SPACE SCREENS

**THE COLORADO FUEL AND IRON CORPORATION**

*In the West:* THE COLORADO FUEL AND IRON CORPORATION — Albuquerque • Amarillo • Billings • Boise • Butte • Denver El Paso • Farmington (N. M.) • Ft. Worth • Fresno • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City Phoenix • Portland • Pueblo • Sacramento • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Wichita
*In the East:* WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Phila.
CF&I OFFICE IN CANADA: Montreal CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

# The Standard of Comparison Around the World



# HENDRIX DRAGLINE BUCKETS

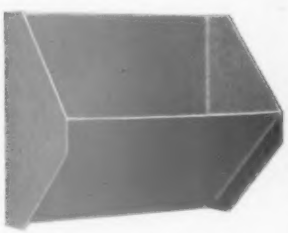
Hendrix Lightweight DRAGLINE BUCKETS

*"A Type for Every Digging Purpose"...*
*¼ to 40 Cubic Yards-Perforated or Solid*

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

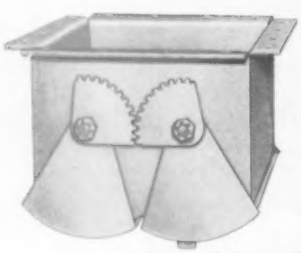
# WHAT WERE YOUR CONVEYING / ELEVATING COSTS LAST MONTH?

**Industries cut costs month after month with Standard Metal Equipment**



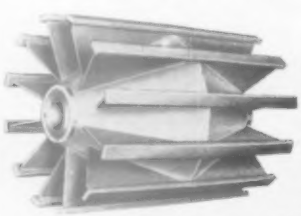
**STANDARD METAL'S CONTINUOUS ELEVATOR BUCKET STYLE No. 2**

This long-life bucket resists wear — delivers outstanding service and economy under severest conditions. This style is just one of the complete line of low-cost, rugged steel buckets manufactured by Standard Metal. Available in Salem, Style "A" and other continuous style buckets.



**STANDARD METAL'S BIN GATES**

Here's the all-steel, gear-operated Duplex Bin Gate for faster, easier material handling at minimum cost. Now supplied standard with twin bracket at bottom of gate, drilled to accommodate bolt for fulcrum lever. Single Bin Gates by Standard Metal also available.



**STANDARD METAL'S WING-TYPE SELF-CLEANING PULLEY**

Includes Taper-Lock Split Bushing to save time and trouble when mounting shaft. These pulleys are light in weight, yet their all-steel welded construction resists breaking, and delivers many years of trouble-free, low-cost service. Also available with solid hubs bored to specifications.

*Contact us for full details and quotations on your particular needs in elevating and conveying equipment—for new installations or replacements. Ask for the catalog showing the complete Standard line.*

The Standard Metal M.F.G. Co. Since 1921

**STANDARD METAL MFG. CO.**
110 CENTER ST. MALINTA, OHIO

*Enter 206-A on card, page 183*

# NEW!

*Combination*
**ROTARY-PERCUSSION AIR DRILL**

**Features:**

1. Operates as conventional rotary air drill or as down-the-hole air hammer that can run drag bit or percussion bit.
2. All-hydraulic drive.
3. Completely self-contained . . . tractor engine, all components.
4. Variable speed controls on pull-down and hoist.
5. Hole size 2½" to 4½".

DEALER INQUIRIES INVITED

1103 N. Rice Ave. MOhawk 7-5695

**Carey MACHINE & SUPPLY INC.**

P. O. Box 63 Houston 1, Texas

*Enter 206-B on card, page 183*

*Announcing*

**TERRIFIC Used Equipment BARGAINS**

*See*
**PIT & QUARRY'S Broadcast Section Pages 227-235**

**DEPENDABLE**
FOR 60 YEARS

*Woven Wire*
ALLOY SCREENS

**TWIN CITY IRON & WIRE CO.**
St. Paul, Minnesota

*Enter 206-C on card, page 183*

# "My Boss Read the Specs with Tears in His Eyes"

He looked like he'd lost his best friend — money.

"Goodbye contract," he said quietly. "We just can't hope to meet these government specifications for aggregate."

"Yeah, it's pretty hopeless with our set-up. Of course, if we had a hydraulic classifier — " (I was kidding.)

"You're out of your mind. Around here water costs more than sand."

"Well how about an air separator, like Sturtevant makes?" I shot back. "Pete's brother runs a pit at Rapid City and says they clean sand without water. By de-dusting it."

He was skeptical. "Aren't Sturtevants for cement?"

I nodded. "They are, but you see quite a few in aggregates, too, nowadays. Might be worth a try."

The Boss smiled for the first time that morning. "What the heck are you waiting for? Get 'em on the phone and let's see what they can do."

So we got the contract, thanks to the 12 ft. Sturtevant we now use for de-dusting and pre-classification. It's a beaut. Gives good service outdoors the year round, with no protection except for the motor housing.

If you're in this business, Brother, it might pay you to have a good long look at what a Sturtevant can do for tight aggregate specifications.

**Sturtevant Air Separators** classify production loads up to 150 tph by exact control of air currents and centrifugal force. Simple, quick adjustments make possible the selection (or rejection) of particles in the 30 to 400 mesh range. Nine standard models available, varying in size from 3′ to 18′.

**Learn how a Sturtevant Air Separator can help your aggregates production. Write today describing your needs. Address: Sturtevant Mill Co., 104 Clayton St., Boston 22, Mass.**

## STURTEVANT AIR SEPARATORS CLASSIFY SAND WITHOUT WATER

**PRODUCING CLEAN SAND,** the Sturtevant acts as a de-duster by removing fine mesh particles from the throughput. Particularly valuable where water is limited.

**EASING SCREEN LOADS,** the Sturtevant rejects unwanted fines and circuits coarser sizes to screens for grading. By this pre-classification, the possibility of blinding screens with fines is minimized and output considerably increased. Also, excessive dust problems are eliminated.

**WHEN BLENDING IS NECESSARY,** the Sturtevant selects fines from the crushing operation. This stockpiled product then can be used in the blending operation to overcome fineness modulus deficiencies.

GRINDERS
CRUSHERS
PULVERIZERS
MICRON-GRINDERS

# STURTEVANT MILL CO.

*Dry Processing Equipment*

**The "OPEN-DOOR" to lower operating costs over more years**

MIXERS
BLENDERS
ELEVATORS
AIR SEPARATORS

EXTENSIBLE CLUPAK® PAPER*

# MULTIWALL BAGS OUT-PERFORM CONVENTIONAL KRAFT IN THE 3 TOUGHEST TESTS IN PACKAGING TODAY!

## 1 In Handling And In Transit!

Multiwall and baler bags made of new CLUPAK extensible paper withstand the strain and impact that cause conventional bags to rip, split or tear. This increased toughness allows multiwall and baler bag users to increase package strength yet decrease the number of plys with resulting economies. The next time you order, say CLUPAK before you say paper and see how it out-performs your present packaging material.

## 2 In The Warehouse!

Stack them high! Multiwalls and baler bags made of CLUPAK extensible paper hold greater loads, take greater strains, stack compactly and safely even with lower basis weight paper. The stretch and "give" built into CLUPAK extensible paper withstands punishment that often rips, splits and tears conventional kraft. Bags with the trademark CLUPAK warehouse faster—without "kid glove" treatment.

## 3 On The Filling Line!

Here, where multiwalls get their first and often most rigorous test, particularly on high speed filling and packaging equipment, CLUPAK extensible paper multiwalls are unexcelled! Their high energy absorption reduces breakage, helps maintain uninterrupted production schedules, cuts product waste and repackaging costs. Plan a trial shipment of multiwalls made of CLUPAK extensible paper!

Prior to CLUPAK extensible paper, there were no controlled standards of toughness in the paper industry. Clupak, Inc., is proud to have established these standards and permits the use of its trademark only on paper which meets these rigid toughness requirements.

EXTENSIBLE CLUPAK® PAPER

**Ask your salesman about this revolutionary new material... prove to yourself that multiwall bags made of CLUPAK extensible paper give you...**

**GREATER STRENGTH WITH LOWER TOTAL BASIS WEIGHT**

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N. Y. 36, N. Y.

G. C. Robertson

GEORGE C. ROBERTSON has been named manager of the Miami district for P & H construction and mining equipment manufactured by Harnischfeger Corporation, Milwaukee, Wis. He replaces JACK E. LAFFEY, who recently became regional manager for the eastern division.

Mr. Robertson's district includes all of Florida, except the extreme panhandle, west of the Apalachicola River. He will work closely with Harnischfeger dealers in Miami, Tampa, West Palm Beach, and Tallahassee. Headquarters for the district will be at 12035 S. Dixie Highway, Miami.

The Heil Company has acquired the materials handling equipment business of the Ingersoll Kalamazoo Division of Borg-Warner Corporation. Machinery and fixtures used in the production of the equipment will be moved from Kalamazoo, Mich., to Heil's main plant in Milwaukee, Wis., and will be operated as part of the Body and Hoist Division of The Heil Company.

The principal product in Ingersoll Kalamazoo's materials handling line is the Load-Lugger, which consists of large detachable steel containers or bodies that are picked up, hauled and dumped by a truck equipped with a Load-Lugger mechanism.

The Heil Company operates factories at Hillside, N. J.; Lancaster, Pa., Cleveland, O.; and Modesto, Calif., in addition to two large facilities in Milwaukee.

Fairbanks, Morse & Company has announced four new appointments from within the company at the pump and hydraulic division. Advancing to director of marketing at division headquarters in Kansas City, Kans., is WILLIAM F. WAHLENMAIER, who was formerly assistant to the company-wide director of marketing at Fairbanks-Morse executive offices in Chicago.

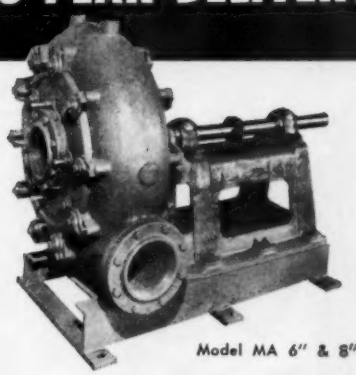
Plant manager appointments stem from a vacancy created when CHRIS E. CLAUSEN was promoted from manufacturing manager at the pump and hydraulic division at Kansas City to general manager of the Fairbanks-Morse scale division in Fair Lawn, N. J.

The appointments: C. HAROLD JOHNSON, manager of the Kansas City Works; W. PAUL MCANALLY, manager of the Stuttgart, Ark. Works; and T. RAY MACKAY, manager of the Pomona, Calif., works.

Atlas Powder Company's Senter Plant near Houghton, Mich., was closed in December. MAX E. COLSON, vice-president and general manager of the company's explosives division, stated that the closing of the dynamite plant was the final phase of the company's plans to consolidate all of its explosives manufacturing facilities at fully integrated ammonium nitrate and dynamite plants in Missouri and Pennsylvania, and to revamp its explosives distribution system.


**PERFORMANCE-PROVED DESIGN for CONTINUOUS PEAK DELIVERY**

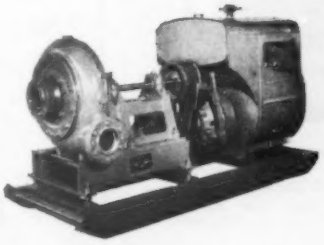
Lightning SAND AND GRAVEL PUMPS



Model MA 6" & 8"

**Compact Design... Rugged Construction**

**LIGHTNING Model MA handles large quantities of sand and gravel economically, up to a total head of 100'. Simple design makes it easy to maintain close internal clearances. Rugged construction withstands the shock of large solids passing through. Large, clean passages insure maximum and continuous delivery.**



**Available Mounted on Skid Base Complete with Gasoline Engine**

Close coupled with V-belt drive. Either pump or industrial gasoline engine may be removed from the structural steel base for separate use. Model MA pump is light in weight and compact, for easy handling.

*"Sixty years of service to the sand and gravel industry." We offer a complete line of pumps including rubber-lined and new ceramic-lined models. Write for complete information.*

**The KANSAS CITY HAY PRESS COMPANY**
801 Woodswether Road • Kansas City 5, Missouri

*Enter 209 on card, page 183*

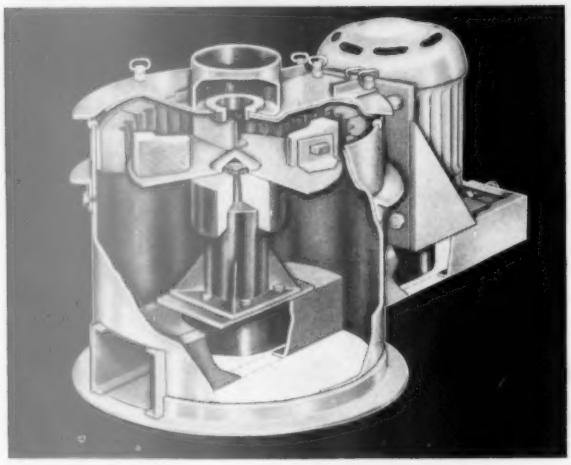
# HAVE YOU CHECKED THE NEW, BETTER WAY TO CRUSH?

enthusiastic users say the

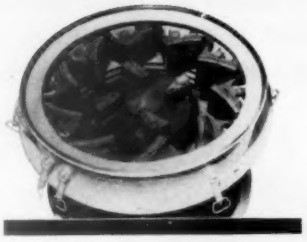
# TORNADO

## SQUARE IMPACT CRUSHER

turns out a dense graded cubical product—yet it is the most versatile crusher ever put on the market. Produces any range of crushing, to screen



to any gradation required, in an almost unbelievable number of tons per hour, and does it at less cost than Rod Mills or other types of Crushers priced up to TEN TIMES AS MUCH!



Virtually no "down time"—you can keep it in operation 22½ hours a day, 7 days a week, year after year.

Light in weight—requires no massive foundation and little head room. Power requirement amazingly low. No zincing or babbitting needed.

Write, wire, or phone collect for details. We'll run a sample of your own material through the Tornado to PROVE how much it will do for you.

**WERCO Steel Company**

2151 East 83rd Street, Chicago 17, Ill.
Phone ESsex 5-8446
Cable Address, IMPACTOR

*Enter 210 on card, page 183*

# IDLE EQUIPMENT WASTES MONEY!

Got an old crusher sitting around doing nothing? A kiln? A shovel? Why not convert that idle equipment into ready cash!

Pit and Quarry's Broadcast pages are read each month by thousands of men in the industry. Some of them are probably looking for exactly the machine you're no longer using and would like to sell.

Most of our Broadcast advertisers have been with us for years. They know that their ads in *"The Marketplace of the Industry"* are bringing results.

A small ad costs you only $11.50 and we'll be glad to send you a rate card if you're interested in larger ads running more than once. Just drop us a line.

**PIT and QUARRY PUBLICATIONS, INC.**

431 S. Dearborn St.
Chicago 5, Ill.

# Specify SANDVIK COROMANT ROPE-THREAD bits and steels

## ...for quick hand uncoupling!

No, it's not child's play, but the fact is you can uncouple Sandvik Coromant Rope-Thread bits and steels by hand! Smooth, shallow-depth, rounded threads with a pitch of just 2 turns per inch prevent binding. You'll have fewer thread failures too, compared with "saw-tooth" thread designs. What's more, only the threads are hardened, so you can re-thread steel sections without heat-treating. And, with faster uncoupling, you'll drill more feet per shift!

Coromant bits and steels have many other advantages, too: Better quality carbide (Sandvik is one of the largest manufacturers of carbide in the world)... better, more rigid steel... superior workmanship... all add up to above-average bit and rod life, up to double the footage between sharpenings, and straighter, cleaner holes.

Want proof? Easy! Call us and we'll arrange for a demonstration and test on your job. Write us today. Address: Dept. PQ-11.

**Atlas Copco**

545 Fifth Avenue, New York 17, N.Y.

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

# DAYBROOK
## DUMP TRAIN

## Hauls 115 more tons per day FOR $50 LESS!

Day and night, about every 5 hours during the busy seasons, you'll see a Daybrook aluminum dump train pull out of the Spring Lake Coal & Dock Company dock yard at Spring Lake, Michigan. From here, it highballs along Michigan highways, carrying a 42-ton payload. Destination reached, Daybrook telescopic hoists swiftly lift and discharge the load of gravel or limestone.

**Carries 215% More Payload**

President Vernon J. Verplank says, "Where we formerly hauled payloads of 19½ tons in steel body units, we now carry 42 tons in our Daybrook aluminum Trailers. We figure we not only haul more, we save $50.00 per day. Other savings include freedom from maintenance, no painting, longer life." Daybrook can fill the bill for you, too! 30 models of aluminum or steel bodies from 1½ to 27 yd. in choice of contractor, excavator, platform and rock body styles.

See your Daybrook Distributor today for complete details. **Equipment Division, Young Spring & Wire Corporation, Bowling Green, Ohio.**

YOUNG SPRING & WIRE CORPORATION

*EQUIPMENT DIVISION*
MANUFACTURERS OF
**DAYBROOK**
TRUCK EQUIPMENT AND
**OTTAWA**
CONSTRUCTION EQUIPMENT

***Enter 212 on card, page 183***


W. E. REXROAT has been named works manager of the Buffalo-Springfield Company, Springfield, Ohio, manufacturer of water and blast hole drills. Buffalo-Springfield is a division of Koehring Company. Mr. Rexroat joined the company in 1941 via the Parsons Company, another Koehring Division. He has served in managerial capacities with the Parsons Company as well as with Koehring Company's Canadian subsidiary Koehring-Waterous Ltd.

W. E. Rexroat

M. Pigott

Worthington Corporation has appointed MEL PIGOTT distribution representative for its complete line of construction equipment. His territory will cover western Pennsylvania; western New York; counties Garrett, and Allegany in the State of Maryland; and counties Hancock, Boone, and Marshall in the state of West Virginia. Mr. Pigott previously was sales manager, Morrissey Brothers Tractor Company, Boston, Mass.

To dramatize the Moline "heel-and-toe" operation and the "Comfort Control Zone" design of its new 54 b.h.p. MOTRAC crawler, Minneapolis-Moline toured the country in July and August with a caravan conducting clinics and demonstrations in cooperation with its dealer organization. Included in the traveling group were ROGER R. HIPWELL, Moline construction equipment sales manager, and JOE JUREK, general service engineer.

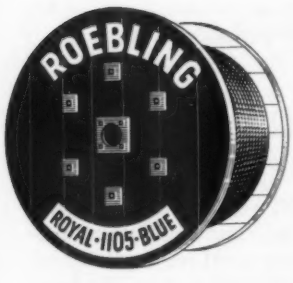
E. J. BRADY, president, Alloy Rods Company, announces the appointment of F. L. BLODGETT to the post of general manager of the company's Hard Surfacing Products Division. Prior to this new post, Mr. Blodgett was general sales manager for the company.




***Enter 213 on card, page 183*** →

## ROEBLING ROYAL BLUE WIRE ROPE

## WE PUT A LOT OF WORK INTO IT—YOU GET A LOT OF WORK OUT OF IT




This happens to be the inside view of Roebling Royal Blue — its core has been removed to show the uniformity and symmetry of the rope structure. You see how concerned we are with internal security.

We have to be. To make sure that Royal Blue will live up to the day-to-day demands made upon it. High stresses and unavoidable overloads, abrasion, fatigue, impact, crushing, sheave pressures and abusive drum-winding, to name the major ones.

Royal Blue goes through many inspections and tests—both internal and external —before reporting to work. This way we're sure that the rope we build will do what we sell it to do. These quality-control measures are your assurance that Royal Blue is made to save you money — anyway you look at it.

For details about hard-working Royal Blue, ask your wire rope distributor or write Roebling's Wire Rope Division, Trenton 2, New Jersey.

**ROEBLING**

Branch Offices in Principal Cities • John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

THERE IS THE RIGHT BIT FOR YOU OUT OF THE MANY POSSIBLE COMBINATIONS OF SIZES AND TYPES

Write today . . . giving all information you can provide. Out of the many combinations possible with four matrices, several stone size ranges, three grades of diamonds, and various face contours we will recommend the bit we believe to be the best suited for your drilling conditions.

Always specify Sprague & Henwood "Oriented" Diamond Bits. They are described and illustrated in Bulletin 320-1.

SPRAGUE & HENWOOD, Inc.
SCRANTON 2, PA.
MEMBER OF: DIAMOND CORE DRILL MANUFACTURERS ASSOC.

New York — Philadelphia — Nashville — Pittsburgh — Tucson — Grand Junction, Colo. — Buchans, N.F.
EXPORT SALES: SPRAGUE & HENWOOD INTERNATIONAL CORPORATION, 11 W. 42nd St., N.Y., N.Y.
*Enter 214-A on card, page 183*

Maintenance Tip No. 3

PROPER APPLICATION OF SCREEN SECTIONS

When installing a vibrating screen section, be sure it is centered and aligned. Take up tension from both sides of the vibrator to maintain centered position and keep hooked edges from deforming — exam circle above. Tension or pull must be horizontal to prevent whipping or slipping of screen sections. Check the application carefully. Call Cleveland Wire Cloth for valuable assistance and top quality vibrating screen section cloth.

Write for *FREE* maintenance-reducing check sheet today.

THE CLEVELAND WIRE CLOTH & MFG. CO.
3576 EAST 78th STREET CLEVELAND 5, OHIO
*Enter 214-B on card, page 183*

A number of executive changes in its bag division were announced recently by Union Bag-Camp Paper Corporation. HARRY RECHER, former director of flexible packaging sales, was named manager of bag sales.

WILLIAM MELLICK, former director of chain store sales, was appointed director of flexible packaging sales. FRANK LITTLE continues as director of standard products sales, and has been given the additional responsibility of supervising chain store sales.

Both Messrs. Mellick and Little, as well as J. J. PATTERSON JR., who continues as director of multiwall bag sales, will report to Mr. Recher.

The annual meeting of the Conveyor Equipment Manufacturers Association was held in October at the Greenbrier Hotel, White Sulphur Springs, W. Va. Attention was focused on new foreign markets for capital goods.

E. H. WOODBERRY, assistant to the vice-president, Lamson Corporation, Syracuse, N. Y., was elected 1961 president of CEMA, succeeding ORLAN A. JOHNSON, manager of sales, Gifford-Wood Company, Hudson, N. Y.

GEORGE H. WOODLAND, vice-president, marketing, Chain Belt Company, Milwaukee, Wis., was elected vice-president; H. E. MURKEN, manager conveyor systems sales, Hewitt-Robins Incorporated, was elected treasurer; and E. D. WEINTHALER, vice-president, Conveyor Systems, Incorporated, Morton Grove, Ill., was elected secretary.

R. C. SOLLENBERGER was re-elected executive vice-president of the association. This will be his sixteenth year as head of the CEMA office in Washington, D. C.

WILLIAM P. MCCONNELL has been appointed domestic sales manager for the Smith Engineering Works, Milwaukee, Wis. He has been Pacific Northwest district manager for the company in Portland, Ore., for the last five years. JOHN P. RUDOW, chief service engineer since 1955, succeeds Mr. McConnell in Portland.

# How Union-Camp's 5-Star Plan saved multiwall user up to $450 per carload of bags

This is a new kind of "Big-Inch" story.

A major mid-west packer* wasn't convinced his multiwall bagging operation was all it might be. Could Union-Camp's 5-Star Multiwall Plan help?

To get the answer, Union-Camp multiwall specialists visited the plant. They found that the automatically filled bags occasionally stuck in the sewing head. Also, that the sewing line tended to "belly" and form an arc pattern. The result was considerable loss in production and frequent breakage. Another problem—the bags didn't warehouse well.

### "Sew-Straight" Solution

After completing their analysis, the Union-Camp men suggested installing a "Sew-Straight" attachment right onto the sewing head. The bags could now be closed with an "E" head in a perfectly straight line. And only *1 inch* from the top of the bag. That single inch made all the difference.

### Less paper—less breakage

To begin with, shorter bags could be used. The savings in paper alone cut the firm's multiwall costs from between $350 to $450 a carload. Imagine the savings based on several dozen carloads a year!

**Before and After.** Old, semi-circular closure pattern (left) and the new closure (arrow). Note the straight sewing line, and how close it is to the top of the bag.

The new attachment also speeded production by eliminating sewing head jam-ups. Moreover, since the top closure is now identical to the *factory-sewn* bottom closure, the bags form a perfect pillow shape—no awkward ears. This makes them easier to handle . . . easier to stack. And there's less breakage and fewer rejects.

### How much could you save?

Perhaps an idea unearthed through Union-Camp's 5-Star Plan could save you money. The chances are excellent. For every day, multiwall users, large and small, are reducing their multiwall costs by capitalizing on this comprehensive packaging service. Their savings run from a few thousand dollars to over $100,000 a year.

Apart from bag construction, this economy program covers bag design, specifications control, packaging machinery, and a survey of your materials handling operation. And it costs you nothing—regardless of the brand of bags you now use.

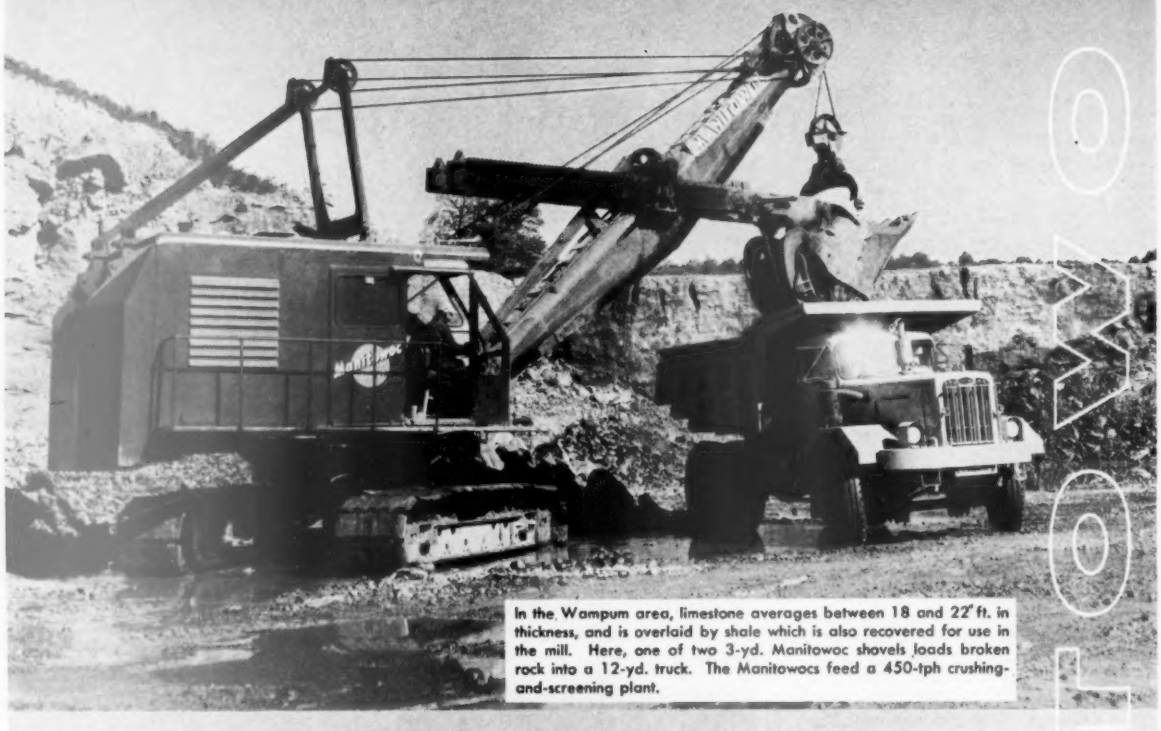
**FREE 16-PAGE BOOKLET**

Write Dept. M-3 today for a free copy of Union-Camp's new 5-Star Plan booklet. It describes many case histories showing how packers like yourself have achieved greater efficiency and economy in their multiwall operation.

**UNION-CAMP**
MULTIWALL BAGS
Union Bag-Camp Paper Corporation 233 Broadway N.Y. 7, N.Y.

* NAME ON REQUEST

# PROFITABLE EXPERIENCE *makes major cement producer a Long-Time* MANITOWOC *user*



In the Wampum area, limestone averages between 18 and 22 ft. in thickness, and is overlaid by shale which is also recovered for use in the mill. Here, one of two 3-yd. Manitowoc shovels loads broken rock into a 12-yd. truck. The Manitowocs feed a 450-tph crushing-and-screening plant.

## Two more Manitowocs handling loading in company's newest quarry

In equipping a quarry serving its new mill at Wampum, Pa., this well-known cement company chose a pair of 3-yd. Model 3600 shovels to excavate shale and limestone. With a fleet of Manitowoc shovels already operating in other company pits, the choice was a natural one. In location after location, when final operating costs are figured, it's the Manitowoc that's handling more rock at less cost per ton than any other loading equipment.

There are good reasons why a Manitowoc shovel gives this kind of performance. Simplicity of design throughout the machine, with fewer gears, gives a Manitowoc full power at the dipper . . . enables it to cut through the toughest material. Long, wide-spread crawlers and a massive one-piece car-body provide needed stability for loading rock at a fast, even pace. Air controls and torque converter drive (available for most models) make the entire dig-and-dump cycle as smooth as it is powerful.

These are only the highlights of Manitowoc advantages that make repeat buyers of quarry after quarry. Your Manitowoc distributor will be glad to give you complete details.

Manitowoc **MANITOWOC ENGINEERING CORP.**
(A subsidiary of The Manitowoc Company, Inc.)
Manitowoc, Wisconsin

SHOVELS — 1¼ to 6 YDS. DRAGLINES — 1¼ to 7 YDS.

1-K

MANITOWOC

C. E. Craft

CHARLES E. CRAFT has joined Republic Rubber Division, Lee Rubber and Tire Corporation, Youngstown, Ohio, as a field representative. He will headquarter in Midland, Texas, and will solicit Republic products in the West Texas and New Mexico area under the jurisdiction of Republic's southwest district office in Houston, Texas. The manufacturer reports that Mr. Craft's broad experience qualifies him for specialized oil industry selling, as well as general line industrial rubber sales.

The Walmsley (Bury) Group Ltd., Bury, Lancashire, England, world-renowned builders of high-speed paper machinery, have now been licensed by Clupak, Incorporated to build the machinery for making CLUPAK extensible paper.

Walmsley's is the fourth machinery company licensed by Clupak, Inc. to build and install extensible paper machinery, others being: Beloit Iron Works, Beloit, Wis.; The Sandy Hill Iron & Brass Works, Hudson Falls, New York; and Mitsubishi Heavy Industries Reorganized, Ltd., Japan.

The appointment of WILL MITCHELL JR. as acting director, Research Division, Allis-Chalmers Manufacturing Company, has been announced. Mr. Mitchell previously was associate director of the company's Research Division. He succeeds the late DR. H. K. IHRIG who was director of research and vice-president of the company.

Mr. Mitchell joined Allis-Chalmers in 1947 as director of the firm's basic industries laboratory, and a short time later was named research supervisor.

He is past president of the Mining Society of the American Institute of Mining, Metallurgical and Petroleum Engineers, and formerly a member of the board of directors of the American Institute of Metallurgical Engineers.

Joy Manufacturing Company, Pittsburgh, Pa., has appointed Stephen Laskevich Jr., as district manager of the company's Knoxville, Tenn., district sales office covering the states of Kentucky, Tennessee, Virginia, North Carolina, South Carolina, Georgia, Mississippi, and Florida.

He has previously served in Joy's Arkansas-Oklahoma; Kansas City, Mo.; and Cleveland, Ohio sales districts.

L. A. DEPOLIS, vice-president, marketing, LeTourneau-Westinghouse Company, Peoria, Ill., has announced the appointment of LLOYD A. RAGER as manager of the newly established Products Marketing Department. Mr. Rager, who has been product manager of the Motor Grader Division for the past 18 months, will assume his new duties immediately. He will be responsible for the coordination of all company sales and marketing functions and facilities, including sales promotion and training. He has been associated with the firm since 1936.


FOR DEPENDABILITY PLUS ECONOMY
REPLACE WITH
INDIAN BRAND

Get the most out of your present equipment. When you need replacements, remember we started in 1913 to build our reputation in the Manganese Steel field for dependability plus economy.

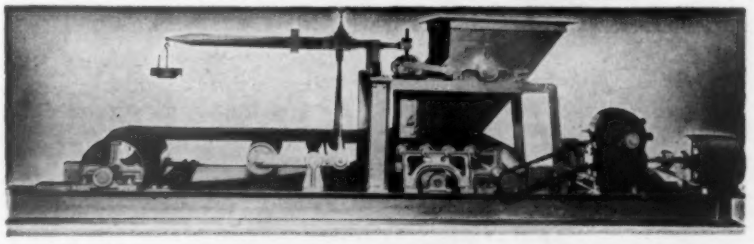
Insist on INDIAN BRAND MANGANESE STEEL

Shovel Dippers • Dipper Teeth
Shovel Treads
Crusher Jaw Plates
Mantles • Concaves
Bowl Liners • Roll Shells
Pulverizer Hammers
Grate Bars • Breaker Plates
Ball Mill Liners • Screen Plates
Misc. Manganese Steel Castings

THE FROG, SWITCH AND MANUFACTURING COMPANY
Carlisle, Pennsylvania • Established 1881

Enter 217-A on card, page 183





SCHAFFER POIDOMETERS

• 1600 SERVING BULK MATERIAL PROCESSORS •

Schaffer Poidometers are available with remote control devices for showing and changing feed rate, and total weight recorders

•

WRITE FOR FREE CATALOG NO. 5

SCHAFFER POIDOMETERS give automatic performance in WEIGHING, BLENDING, FEEDING, MIXING, RECORDING and PROPORTIONING of all BULK Materials. Schaffer Poidometers are dependable and eliminate production line snags. This gives you complete assurance against costly errors.

SCHAFFER POIDOMETER CO.
2828 SMALLMAN ST.
PITTSBURGH 22, PA.

Enter 217-B on card, page 183

C&EC Co
Continental
CONVEYOR
IDLERS

STANDARD ITEMS FROM STOCK!

Whatever your needs in bulk materials handling equipment, you'll find it in the Continental Conveyor line. Pulleys, Bearings, Take-Ups, Drives, Trippers, Feeders, Hold-Backs.

Call on your
CONTINENTAL CONVEYOR MAN

Continental
CONVEYOR & EQUIPMENT CO.
Winfield Alabama

Sales Offices in: ATLANTA BIRMINGHAM DALLAS HUNTINGTON MEMPHIS NEW YORK

Formerly Industrial Division, Continental Gin Co.

Enter 218 on card, page 183

ROBERT F. STEWART has been elected a vice-president of Joy Manufacturing Company, and general manager of the Western Precipitation Division, Los Angeles, Calif.

R. F. Stewart

L. E. Davis

The division manufactures industrial dust and fume collection, air pollution control, and process equipment.

Mr. Stewart has been assistant general manager of Western Precipitation Division for the past year. Since joining the company in 1946, he has been divisional vice-president, sales manager, manager of proposal and contract, and a sales engineer.

LOGAN E. DAVIS has been appointed manager, mining industry sales for Western Precipitation Division. Mr. Davis has wide experience in mine and plant dust and fume control. Most recently, he was manager of the ventilation, dust collection, and air conditioning division of a well known concern dealing with the mining, metallurgical processing, and quarry industries.

With his headquarters at the Joy Manufacturing Company, Mining & Construction Division office at Salt Lake City, Utah, Mr. Davis will also serve as manager of the Salt Lake City office of Western Precipitation Division. He will also be responsible for the division's negotiations with mining and metallurgical processing industries on an international basis.

Baldwin-Lima-Hamilton Corporation, Construction Equipment Division, Lima, Ohio, announces the appointment of Construction Equipment Company, Incorporated, Pittsfield Road, Epsom, N. H., as distributor for LIMA Austin-Western crushing, screening and washing equipment; and for Lima shovels, cranes, draglines, pullshovels, and the Lima Roadpacker. Territory is the entire state of New Hampshire.

A new 70,000 sq. ft. single floor branch house was recently opened by the J. I. Case Company. The new building, located at 2735 Highway 55, St. Paul, Minn., replaces the former branch house located at 233 Park Ave., S. in downtown Minneapolis, Minn.

The facility, designed for convenience and service to dealer customers, is situated to provide for expansion and easy access to the proposed freeways. It is adjacent to rail, truck, and air freight. The Twin Cities Branch continues under the supervision of P. J. PENN, branch manager, serving western Wisconsin and most of Minnesota for Case agricultural and utility equipment, and the same area, plus several additional states, on the Case industrial line.

E. M. PROCTOR, manager of production for the western operations of Bemis Bro. Bag Company, has been named assistant director of production for the entire company. Mr. Proctor, who will move from the firm's western headquarters in San Mateo, Calif., to the general offices in St. Louis, Mo., joined the company in 1926.

He became manager of Visinet (open-mesh) sales in 1939 and was placed in charge of all open-mesh sales and burlap distribution in 1942. Twelve years ago, he was appointed manager of the company's Seattle manufacturing plant, and in 1956 he was named manager of production for western operations.

Promotion of F. W. BLOECHER JR. to assistant manager of the mining chemicals department of Cyanamid International has been announced. He will coordinate the efforts of Cyanamid's research and market development units in the mining chemicals field with the company's technical representatives outside the United States and Canada.

Mr. Bloecher joined Cyanamid as a research engineer in mining chemicals in 1951 and was appointed sales engineer for the company's mineral dressing division a year later. In 1959, he assumed a similar position with Cyanamid International.



Enter 219 on card, page 183 ➔

# FRAME FOR THE "World's Finest"

**A truck** cannot possibly be better than its frame. This is Autocar's philosophy, and we build the truck frame accordingly.

Analysis comes first. Precisely *what* is being hauled—*where* will stress and strain fall—how will the conditions of terrain and load be met? Many answers are needed before blueprints are drawn and custom-building begins.

Then Autocar starts with the finest rails money can buy: heat-treated chrome-manganese molybdenum steel. Nut-and-bolt construction throughout, as in modern skyscrapers. *No* extra holes in the frame—only those drilled to specifications.

Result: a frame rigid enough to support the load and maintain component alignment, yet sufficiently flexible for high roadability. Autocar quality starts with the frame, and never stops, for the life of the truck. Take Autocar, nothing less. Comprehensive White-Autocar service throughout the United States.

Autocar
"World's Finest"

Division of
The White Motor Company
Exton, Pa.

**LET'S GO**
**QUARRY OPERATORS!**

# *44th Annual Convention*

## NATIONAL CRUSHED STONE ASSOCIATION

### *SCHEDULE OF EVENTS*

*Tuesday . . . January 17*

MORNING — GENERAL SESSION
NOON — GREETING LUNCHEON
AFTERNOON — OPEN FOR INDIVIDUAL PLANS
EVENING — COCKTAIL HOUR — BALANCE OF EVENING OPEN FOR INDIVIDUAL PLANS

*Wednesday . . . January 18*

MORNING — CONCURRENT SESSIONS
- SESSION FOR OPERATING MEN AND EQUIPMENT MANUFACTURERS
- SESSION FOR SALESMEN

NOON — GENERAL LUNCHEON
AFTERNOON — SESSION FOR EXECUTIVES AND FINANCE OFFICERS
EVENING — OPEN FOR INDIVIDUAL PLANS

*Thursday . . . January 19*

MORNING — CONCURRENT SESSIONS
- ROUND TABLE DISCUSSIONS FOR OPERATING MEN AND EQUIPMENT MANUFACTURERS
- SESSION FOR EXECUTIVES

NOON — MANUFACTURERS DIVISION LUNCHEON
AFTERNOON — OPEN FOR INDIVIDUAL PLANS
EVENING — "A NIGHT IN THE TROPICS" (DINNER — DANCING — ENTERTAINMENT)

*Friday . . . January 20*

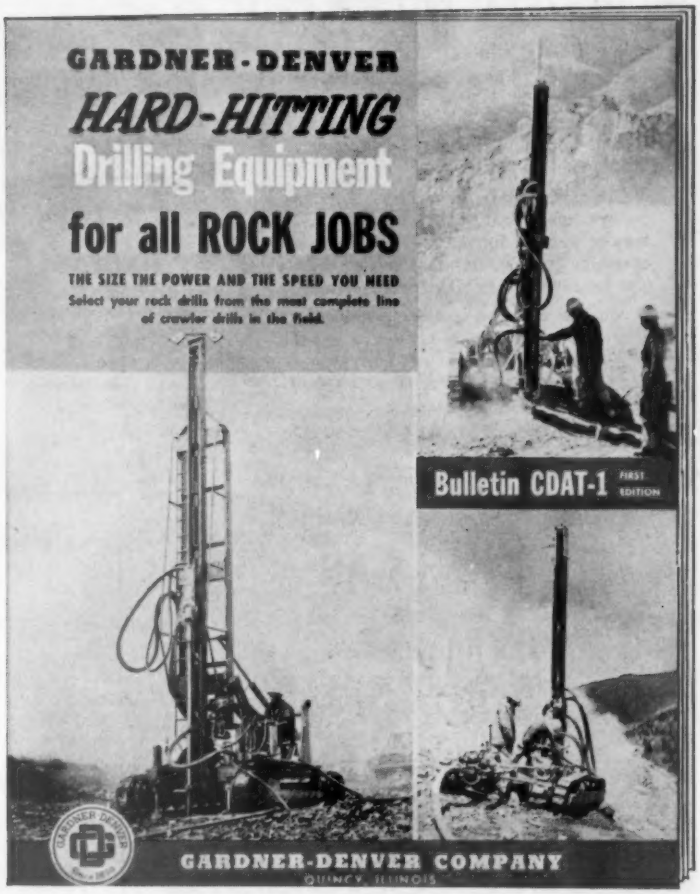
MORNING — GENERAL SESSION
NOON — ADJOURNMENT

**AMERICANA HOTEL, BAL HARBOUR, MIAMI BEACH, FLORIDA**
**JANUARY 17-18-19-20, 1961**

# HANDY GUIDE TO HARDROCK DRILLING

Here's the most complete information on crawler drills ever compiled in one book. At your finger tips are specifications and charts for matching Gardner-Denver carriers, feeds, drills and accessory equipment—tailored to speed the job.

- 5 "Air Trac"® models
- Heavy-duty HT143 crawler drill
- 3 feed masts
- 4 rock drill models
- HI-LEED sectional drill steel
- 3 bit grinders


GARDNER-DENVER
HARD-HITTING
Drilling Equipment
for all ROCK JOBS
THE SIZE THE POWER AND THE SPEED YOU NEED
Select your rock drills from the most complete line of crawler drills in the field.
Bulletin CDAT-1 FIRST EDITION
GARDNER-DENVER COMPANY
QUINCY, ILLINOIS

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

## GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

*See your Gardner-Denver Rock Drill Specialist . . . or mail the coupon now!*

Gardner-Denver Company
Quincy, Illinois
Send Bulletin CDAT-1 to:

*Name*_____ *Title*_____

*Company*_____

*Street*_____

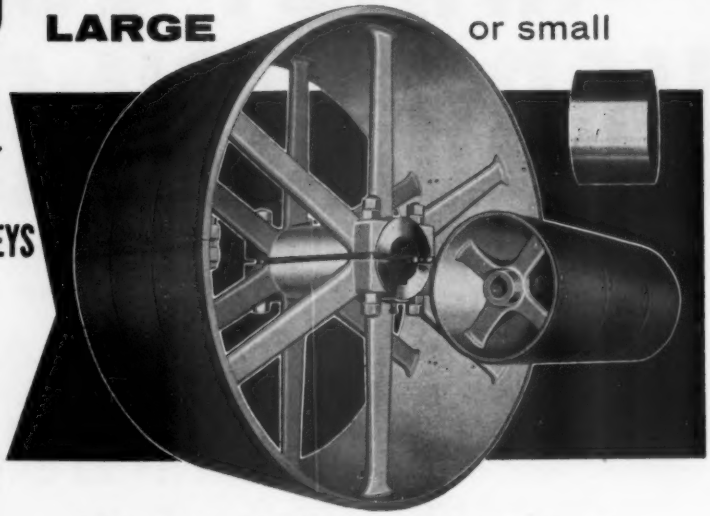
*City*_____ *Zone*_____ *State*_____

# PULLEYS THAT PERFORM ON THE JOB...

LARGE or small

EHRSAM

MICROMETAL CAST-IRON PULLEYS



There is no substitute for experience in producing cast-iron pulleys for use in our many modern industries. Today, after 88 years of experience, the Ehrsam Company is still continuing research to produce quality cast-iron pulleys.

Whether you use small pulleys or large pulleys, totally split pulleys, corrosive surface or wearing surface, you can be sure of quality gray cast-iron plus service when you specify Ehrsam Micrometal pulleys.

In quality cast-iron pulleys, experience counts and this is what Ehrsam is noted for. Call the J. B. Ehrsam and Sons Manufacturing Company and discuss your needs for standard or special pulleys.

**THE J. B. EHRSAM & SONS MFG. CO.**

**ENTERPRISE • KANSAS**

**BRANCH OFFICES:** ATLANTA, GEORGIA; CHICAGO, ILLINOIS; DENVER, COLORADO; DES MOINES, IOWA; FORT WORTH, TEXAS; HASTINGS, NEBRASKA; KANSAS CITY, KANSAS; PHOENIX, ARIZONA; SAN FRANCISCO, CALIFORNIA.

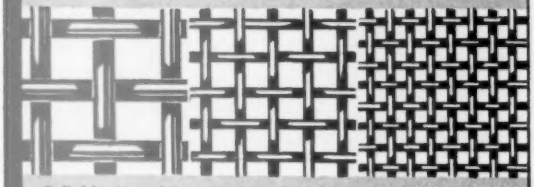
**SALES REPRESENTATIVES:** THOMER EQUIPMENT CO. • MINNEAPOLIS, MINNESOTA

*Enter 222-A on card, page 183*

STRONG AS ARMOR

# NAT-ALOY

*Woven Wire Screens*



Reliable Nat-Aloy woven wire cloth is specified throughout industry for maximum screening accuracy and economy. Available in flat surface, lock crimp, double crimp, rectangular and long slot openings. All sizes, meshes and gauges—prompt shipment.

**WE OFFER NOW...SUPER NAT-ALOY**

**OIL TEMPERED WOVEN WIRE CLOTH**

★ GREATER RESISTANCE TO ABRASION

★ MORE TONNAGE AT LOWER COST

★ FEWER COSTLY CHANGE OVERS

Write for information. Also stainless steel wire screens.

NATIONAL WIRE CLOTH COMPANY

252 W. Fairfield Ave., St. Paul 1, Minnesota

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*Limited quantities still available!*

YOU CAN STILL ORDER COPIES OF

PIT and QUARRY'S

*Comprehensive*

PORTLAND CEMENT PLANT MAP

Here is all of North America in a single map to provide the best available source for the following information—

- name and location of portland cement producing and distributing plants
- name and location of grinding plants and plants under construction
- type of process used by each plant
- plant capacities in bbl/year
- brand name of cement produced

Order direct from PIT and QUARRY at these prices —1 to 10 copies—$1 each. 11 to 25 copies—.75 each. Over 25—.50 each.

**PIT AND QUARRY**

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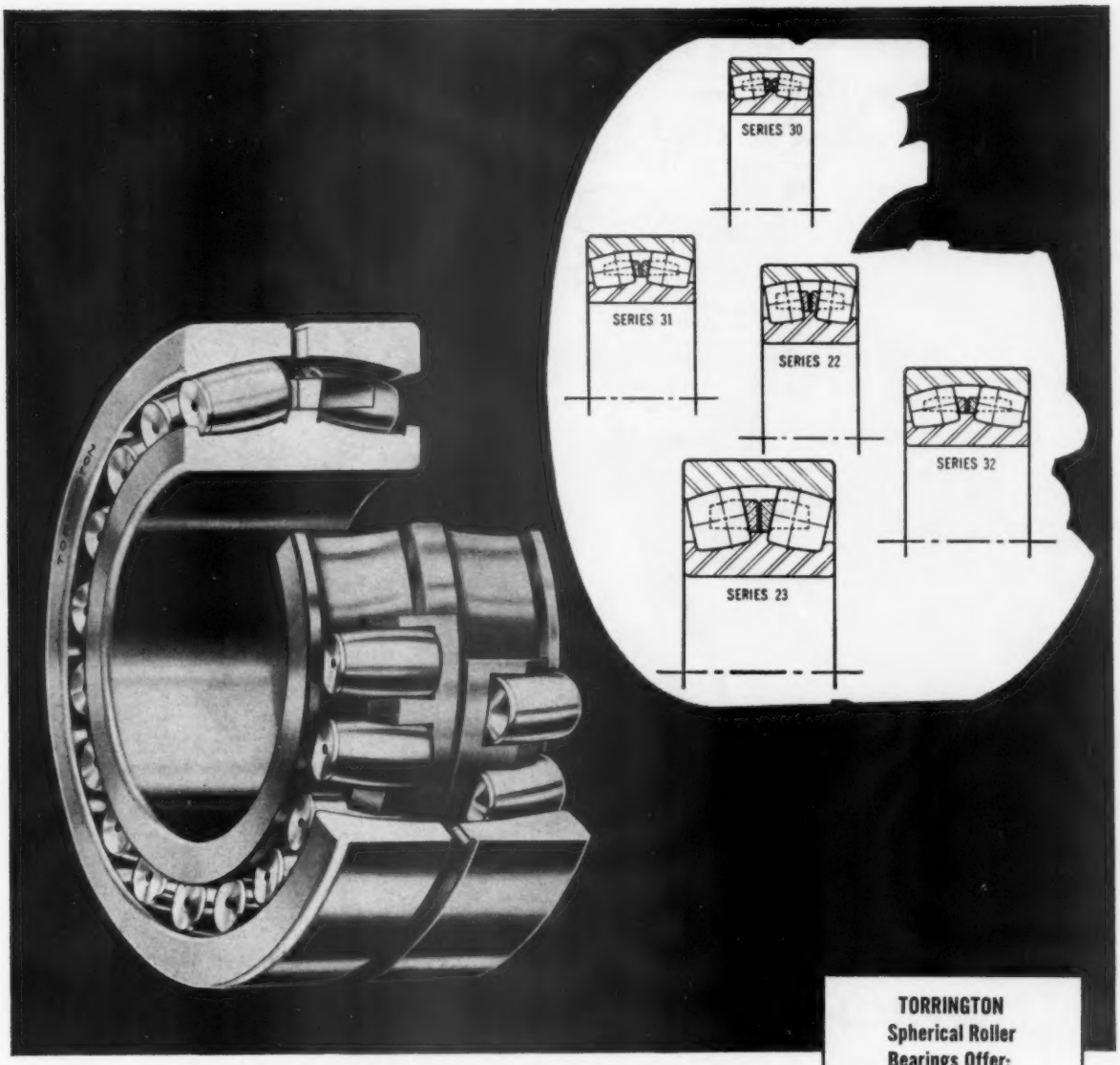
**431 S. Dearborn St. Chicago 5, Ill.**




## *There's a Torrington Spherical Roller Bearing for your application*

Bearings matched *exactly* to the job pay off in better performance, longer life, greater reliability. That's why it pays to specify carefully. And that's why it pays to choose Torrington Spherical Roller Bearings.

Whatever your space limitations or capacity requirements, the five series of Torrington Spherical Roller Bearings provide the right bearing for virtually every industrial application. You can design for straight bore or tapered bore with adapter. You can benefit from extra features such as lubrication groove and oil holes, or selected outside diameters.

Your use of Torrington Spherical Roller Bearings will assure exceptional operation and longer bearing life under the toughest conditions. They're made to Torrington's own uncompromising standards—the highest in the field of anti-friction engineering—by the manufacturer of every basic type of anti-friction bearing.

**TORRINGTON Spherical Roller Bearings Offer:**

- conformity of rollers to raceways
- integral center guide flange for stability
- positive roller guidance
- land-riding bronze cages
- maximum radial and thrust capacity
- controlled internal clearance
- electronically selected rollers
- inherent self-alignment
- even load distribution
- long, dependable service life

Send for new Torrington Spherical Roller Bearing Catalog #258

*progress through precision* **TORRINGTON BEARINGS**

**THE TORRINGTON COMPANY** South Bend 21, Indiana • Torrington, Conn.

# WHICH JOB WOULD YOU TAKE?

If you're like most of us, you'd take the job with the more tempting salary and the brighter future.

Many college teachers are faced with this kind of decision year after year. In fact, many of them are virtually bombarded with tempting offers from business and industry. And each year many of them, dedicated but discouraged, leave the campus for jobs that pay fair, competitive salaries.

*Can you blame them?*

These men are not opportunists. Most of them would do anything in their power to continue to teach. But with families to feed and clothe and educate, they just can't make a go of it. They are virtually *forced* into better paying fields.

In the face of this growing teacher shortage, college applications are expected to *double* within ten years.

At the rate we are going, we will soon have a very real crisis on our hands.

We *must* reverse this disastrous trend. You can help. Support the college of your choice today. Help it to expand its facilities and to pay teachers the salaries they deserve. Our whole future as a nation may depend on it.

**It's important for you to know more about what the impending college crisis means to you. Write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, N.Y.**

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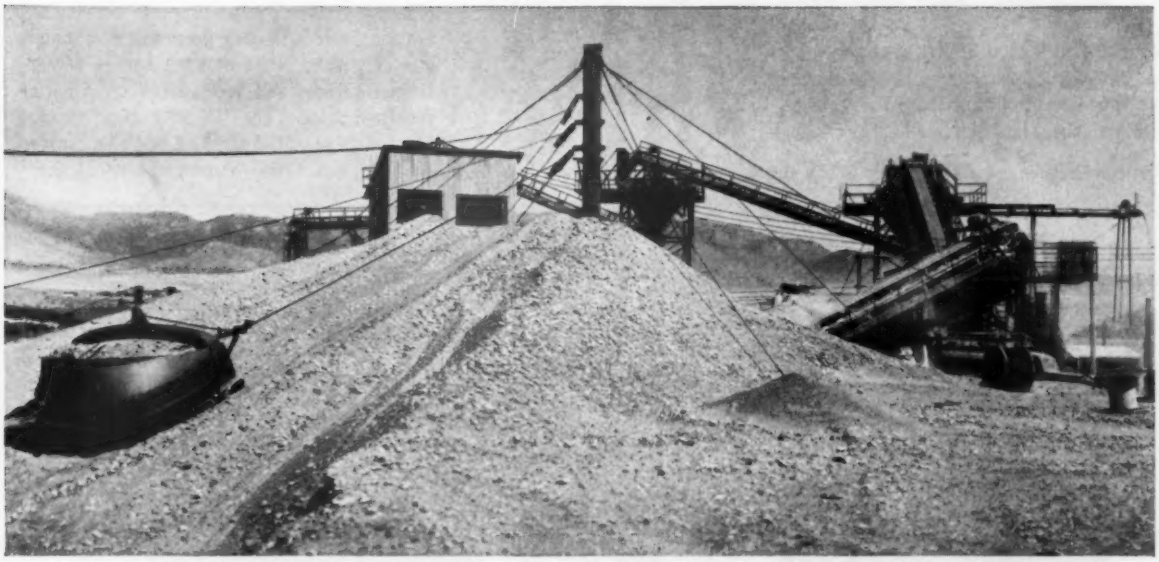
KEEP IT BRIGHT

# ONE TON FOR 6 CENTS...Total Digging and Hauling Cost with a Sauerman



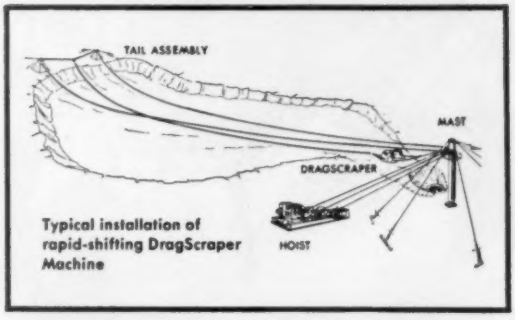
Dig and haul from your high bank, deep pit or underwater deposit direct to plant hopper or stockpile for 6 cents per ton. This cost is based on current job figures for Sauerman DragScrapers operating over average depth and haul distances.

The reason: one man and one machine handle the entire job. You save money three ways over multiple machine methods. Your power costs are much lower. A single operator replaces two or more on your payroll. Your maintenance costs are much lower because only the DragScraper Bucket and cable contact the material handled.

If you are hauling over distances up to 800 ft. or digging under water at depths to 100 ft.—the Sauerman DragScraper Machine is the most economical means you can use.

You can get DragScraper Machines in sizes from ⅓ to 15 yds. to match your tonnage requirements. Write or call about the physical dimensions of your deposit. We'll recommend the proper machine. For general information and detailed data on specific installations request Catalogs A and SG-1.

## Plant Operators Are Saving On Power, Labor And Maintenance With Sauerman DragScraper Machines




Typical installation of rapid-shifting DragScraper Machine

DragScraper Bucket deposits load of sand onto grizzly hopper.

**SAUERMAN BROS., INC.**

634 So. 28th Ave., Bellwood, Illinois
Linden 4-4892 • Cable CABEX—Bellwood, Illinois

Crescent DragScrapers • Slackline and Tautline Cableways • Durolite Blocks

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If great injustices, if inequalities in health, food or education exist anywhere...we all face a constant threat to peace.

Now 19 Specialized United Nations agencies and international organizations work around the world to eliminate these inequalities, to diminish these basic causes of wars.

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**PIT & QUARRY**
**431 S. Dearborn St. Chicago 5, Ill.**



# BROADCAST

## *Section*

### MASTER MECHANIC

Crushed Stone Quarry in Chicago Area. Write, Giving Complete Details of Experience, Education and Salary Earned.

**Box No. PQ-208-B**
**c/o Pit & Quarry Publications**
**431 So. Dearborn St. Chicago 5, Illinois**

### WANTED

4 cubic yard rock bucket for 120B Bucyrus Erie Shovel.

**Box No. PQ-101-A, c/o Pit and Quarry Publications**
**431 So. Dearborn St. Chicago 5, Illinois**

### SALESMEN

Well-established Cleveland Concern needs jobbers and representatives with diesel contacts preferred to sell camshaft re-building and crankshaft plating by exclusive Rotochrome process. Prefer man now calling on people who rebuild diesel engines for the oil industry. Excellent profit margin. Submit details, present lines handled.

**CLEVELAND HONE & MFG. CO.**
**8816 Harkness Rd. Cleveland 6, Ohio**

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Well experienced capable Supt. 16 yrs. of Rock Quarrying, Sand & Gravel and Heavy Equipment Maintenance. Age 38, relocation no problem.

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**431 So. Dearborn St. Chicago 5, Illinois**

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**7 22-Ton Euclids**
**GM 6110 and Cummins Engines**

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Plant Manager ready-mix concrete plant. 20 years experience plant and truck maintenance, sales and collections, good health, used to long hours and hard work. Prefer small plant with salary and profit sharing arrangement.

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*Consultants*
*Designers*

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*Engineers*
*Geologists*
*Technicians*

### JOHN R. RAND INCORPORATED

**Geologic Consulting**

Mineral exploration — geophysical surveys — reserves evaluation — groundwater studies — soils — engineering geology — earth materials — aggregates.

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*Quarries*
*Crushing Plants*
*Cement Plants*
*Storage Methods*
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*Construction*
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*Plant Layout*
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### J. H. ROBINSON AND ASSOCIATES LTD.

*CONSULTING ENGINEERS*

SPECIALISTS IN LIME & GYPSUM DESIGN AND OPERATING PROBLEMS

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**THOMASVILLE DRILLING & TESTING CO.**
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*Anywhere*

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**INGERSOLL-RAND DRILLMASTERS**

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Ready Mix companies should and can earn 12% to 14% net before taxes. Pre-Stressed 10% to 15%; Quarries 40%; Sand, Gravel 30%; Pipe 10% to 12%; Blocks 10% to 15%.

If you are not making this kind of money, our Weekly Profit Control System will enable you to do so.

Our clients, high profit operators in the East, attribute larger earnings to this modern method of weekly operating profit control as distinguished from delayed monthly or quarterly historical accounting controls. Clients' first year profit increases average four times our fees.

*WRITE OR PHONE US*

**ANTHONY B. CASSEDY and ASSOCIATES** *Management Engineers*
**CIRCLE DRIVE RIDGEFIELD, CONNECTICUT Phone: IDlewood 8-8898**

*Specializing in the concrete, quarry and all related industries.*

# CEMENT AND PYRO-PROCESSING ENGINEERS

**The M. W. Kellogg Company,** a well known leader in research, development, design and construction of projects for the petroleum and chemicals industries, has in recent years undertaken a program of expansion and diversification which has included highly successful projects in copper refining, iron ore reduction, and pulp and paper engineering. We have recently entered the cement and pyro-processing field, and are able to offer some unusually interesting opportunities to outstanding men in:

## KEY STAFF POSITIONS

We are seeking graduate engineers presently occupying responsible positions, with extensive experience and a proven record of achievement including the latest developments in the cement industry. Forceful, young personalities with practical experience in start-up and plant operation are highly preferred. Know-how in related fields such as light weight aggregates, lime, etc., and a knowledge of foreign languages is desirable.

### CHEMICAL PROCESS ENGINEER

Thoroughly experienced in all cement processes, raw material evaluation, planning of laboratories, all phases of laboratory work and quality control. Familiar with automatic sampling, X-ray analysers, computer control of raw mix, etc.

### CRUSHING AND GRINDING ENGINEER

Experienced in economic evaluation, design and engineering of all related processes including materials handling, as well as in calculations and sizing of all equipment involved.

### PYRO-PROCESSING ENGINEER

Experienced in economic evaluation, design and engineering of complete kiln departments including detailed calculations for sizing of all equipment including kilns, coolers, preheaters, fans, precipitators, bag houses, etc. Experience in layout of kiln control systems desired.

### CEMENT HANDLING ENGINEER

Experienced in design and engineering of cement handling installations, bag, bulk, and pelletizing plants and distribution stations. Familiar with all problems involved in road, rail and boat shipment of cement.

### INSTRUMENT ENGINEER

Preferably a graduate electrical engineer, fully familiar with latest developments of cement plant controls and automation; including television, radiation absorption type instruments, sonic and master-slave mill feed controls, X-ray analyzers, and computer applications.

### CHIEF BURNER

Extensive experience in start-up and operation of various types of kilns in several plants. Accustomed to working with and without extensive instruments and controls. Trained to push kiln outputs while maintaining product quality and increased efficiency. Proven record in training kiln operators. Bachelor preferred.

Assignments will be in our modern, New York headquarters, near Grand Central Station, and will afford excellent, stable opportunities for professional development and advancement. Progressive insurance, pension plans, and other employee benefits. Your inquiry is invited and will be held strictly confidential.

Please write stating details of background and salary requirements to R. L. Stacom, Manager of Technical Employment.

KELLOGG

**The M.W. KELLOGG Company**

711 Third Avenue, New York 17, New York

# LIQUIDATION SALE

**STRIPPING EQUIPMENT**

1—P&H 1055 dragline
1—Worthington 105 cu. ft. compressor
1—22B Bucyrus shovel
1—803 Lima Shovel
1—93M Marion shovel with $10,000 in parts
1—HD-21 tractor
1—Bay City 650, 1¼ yd. drag
3—Schram Rotary drills
1—McCarthy vertical drill on 2 ton Fed. truck
1—L80 Lorain 1½ yd. dragline
1—Hobart 300 amp. welder
1—Model 8 Northwest dragline
1—"D" Roadster Tournapull
3—TL-25J Lorain ¾ yd. & ¾ yd. Lima
2—Hardsog Horizontal drill
3—Haise loaders Model 75W
6—Wagon drills
1—¾, 3½ & 6 yd. dragline bucket & ¾ yd. clamshell
2—200W draglines 7 yd.
1—Page dragline 7 yd. & 2—760B with 17 yd. buckets
5—D-7 & D-8 Caterpillars and 1 Oliver FD
1—Low Boy & D-4 tractor
2—Compton augers Model 48 & 56
1—10W, 14 yd. bucket
1—93M Marion Dragline 3¼ yd. shovel
1—111M Marion 3½ yd. shovel
1—#362 Marion 2½ yd. shovel
4—Jack hammers
2—10 ton Galion rollers
1—#1005 Koehring 2½ yd. shovel
1—1201 Lima 3½ yd. shovel
1—20 yd. Garwood scraper

**SCALES**

3—20 ft., 25 ft. & 35 ft. truck scales
2—set 40 ft. scales (55,000 lb.)
2—set scales for weighing trip cars
3—set railroad scales (200,000 lb. cap.)
1—75 ton, 56 ft. x 12 ft. track scales

**CRUSHERS**

5—24x36 McNally double and single roll
1—McNally pick breakers
1—24x42 McClanahan & Stone D/Roll
1—60x36 McNally
2—24x36 Bonded scale D/Roll (new rolls)
1—36x48 McNally D/Roll
2—Bradford breaker 7x14 ft. and 9x14
2—24x36 jaw crusher
1—36x10 Pennsylvania hammermill

**BELTS & CONVEYORS**

30 ft. 36" apron conveyor
200 ft. 48" belt (used)
600 ft. 36" belt (used)
70 ft. 60" apron conveyor with drive
60 ft. 36" bucket conveyor
4—PL-11 Elevating conveyors
2—36" belt pulleys (new)
4—outside portable conveyors
1—Model XB-30R Joy 1000 ft. ext. conveyor (like new)
70 ft. (2-35 ft.) 36" flight conv.
1—MTB 30 drive only
90 ft. 16" belt conveyor complete

**VIBRATORS**

2—3x12 Nordberg D. Deck & Simplicity
2—Selectro 4x10 S/D
2—4x10 Gyro D/D & AC ripple flow
1—6x16 Link Belt S/D
2—5x14 Hewitt D/Deck 2 yrs. old
2—3x10 S/D Simplicity
1—6x12 Allis Chalmers D/D rippleflow
1—4x12 Seco double deck
1—3x8 D/D (new) base mounted

**MOTORS**

1—group approximately 50 motors 5-50 HP A/C
4—5 HP D/C motors & 38J motors
60—A/C & D/C motors all sizes to 250 HP
1—250 HP 2300 volt & 2—75 HP 2300 volt
3—200 HP A/C motors
1—Int. UD14A diesel
1—300 HP 695 RPM 2300 volt

**MINE EQUIPMENT & SUPPLY COMPANY**
Box 93 Madisonville, Ky.
Phone TA-1-2644 and TA-1-2646

# IMMEDIATELY AVAILABLE

| | |
|---|---|
| 2—Mod. 150B (6 cu. yd.) Comb. Shovel-Dragline, Electric Air Conditioned. Used less than 7000 hours | $210,000.00 ea. |
| 8—Mod. LRVX Mack Tractors w/30 cu. yd. Mod. 137W Euclid Bottom Dump Trailers. New 1958 | 36,500.00 ea. |
| 10—Mod. PH95A International Payloaders w/30 cu. yd. Mod. PW20 Athey Bottom Dump Trailers. Tractors have new 425 H.P. G.M. Engines | 30,500.00 ea. |
| 10—Mod. DW20 Cat. Tractors w/30 cu. yd. Mod. PW20 Athey Bottom Dump Trailers, 67C Series | 27,000.00 ea. |
| 12—30 cu. yd. Mod. MX30 Southwest Bottom Dump Trailers | 5,000.00 ea. |
| 10—Mod. DW20 Cat Tractors w/456P Cat Modified Scrapers, 67C Series | 27,000.00 ea. |
| 10—D8 Cat Tractors w/PCU's and Dozers, 14A Series | 18,500.00 ea. |
| 5—D9 Cat Tractors w/PCU's and Dozers, 18A Series | 26,500.00 ea. |
| 6—Mod. 12 Cat Motor Patrols, 8T and 80C Series | 8,500.00 to 10,500.00 ea. |
| 9—15 cu. yd. Mod. 63TD Euclid End Dumps | 24,000.00 ea. |
| 4—60" x 20' Link Belt HD Manganese Apron Feeders | 12,500.00 ea. |
| 2—30" x 60" Gruendler Single Roll Impact Crushers | 9,500.00 ea. |
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# WANTED

Qualified agents or dealers to sell modern line of washing and classification equipment to aggregate producers—Exclusive franchised territories available—Liberal return on a modest investment—Write, stating previous experience and desired territory, to

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**35,000 FEET**

# 6" LINE PIPE

**6⅝" OD, 11.88#, 50 ft. pieces. Clean and straight, torched ends or beveled for welding as required. A close out. Write or phone on this material while it lasts. Ready for inspection and shipment, our yards.**

**70¢ PER FT. F.O.B. CARS**

**WHILE IT LASTS!**

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***SUBJECT TO PRIOR SALE***

**GRUENDLER PORTABLE 4XD IMPACT CRUSHING PLANT (used three months)**

Replaced by Unit of double its capacity. Equipped with low level feeder, 30" swing hammer rotor, delivery conveyor, tandem rear wheels, pneumatic rubber tires. Capacity depending on gradation 150 to 200 tons hourly using 200 h.p. net continuous power. Unit presently less power and drive. Location St. Louis. This plant almost like new.

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Equipped with 10 yd. hopper, delivery conveyor, pneumatic rubber tires. Capacity 150 to 200 tons hourly on medium hard limestone. Capacity 200 to 250 tons hourly on Fla. rock. Location Florida. Now on consignment for quick delivery.

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Capacity 35 to 40 tons hourly on intermediate aggregates and ag-stone. Delivery 2 to 3 weeks from St. Louis.

PROMPT DELIVERY—
UNITS SUBJECT TO PRIOR SALE

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14" and 16" Used Rex Idlers
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Colorado Iron Ball Mill 6x4
Pennsylvania Hammermill 30x24, M-2
Jeffrey Hammermill 30x24, A-2
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Farrel Lab. Jaw Crusher 6" x 2"
Farrel Jaw Crusher 36x18
New England Jaw Crusher 14" x 28"
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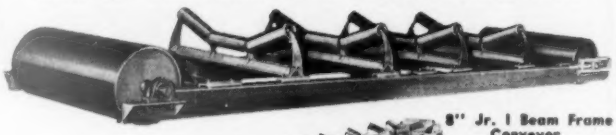
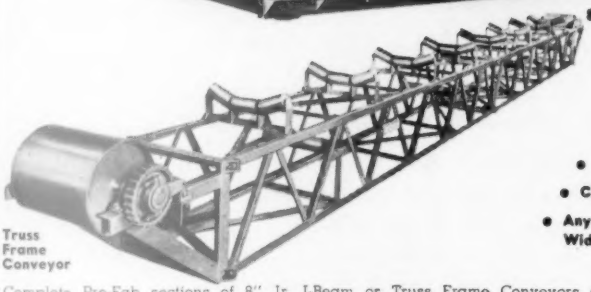
# BONDED QUALITY EQUIPMENT
# FOR INCREASED PROFITS AND LOWER OPERATING COST

**CURRENT MODELS - IMMEDIATE SHIPMENT FROM OUR FACTORY - WRITE, WIRE OR PHONE FOR FREE CATALOG AND PRICES**

## BONDED ® TROUGHING IDLER CONVEYOR BARGAINS





8" Jr. I Beam Frame Conveyor

- Built Like A Bridge
- For High Tonnages
- Clear Spans To 50 Ft.
- Any Length — Any Belt Width

Truss Frame Conveyor

Complete Pre-Fab sections of 8" Jr. I-Beam or Truss Frame Conveyors quickly and easily joined together on the job. These beams are rolled with .20% copper content. Atmospheric exposure tests disclose that they have as much as four times the resistance to corrosion as non-copper steels.

**BONDED TRUSS FRAME CONVEYORS** are built like a bridge and designed for long free spans to 50 feet. Constructed of structural angle and reinforced with steel plate. Both types equipped with 5" roll diam. idlers and return rolls, 20" diam. head pulley and 16" diam. tail pulley mounted on 2¼" or 2-7/16" diam. shaft. Save as much as 50% on **CONVEYOR SPECIALS** with belt in two pieces. All new, fresh stock, 4-ply, 28 oz. duck, ⅛" top rubber cover x 1/32" bottom cover. Made by Leading Manufacturers. **CONVEYOR PRICES INCLUDE BELTING.**

### 8" JR. I-BEAM CONVEYORS

WRITE FOR BULLETIN #1138

| Belt Width | Conveyor Length | Sale Price |
|---|---|---|
| 14" | 25' | $ 766 |
| 16" | 20' | 700 |
| 16" | 45' | 1,128 |
| 18" | 25' | 830 |
| 18" | 45' | 1,190 |
| 18" | 70' | 1,641 |
| 18" | 85' | 1,912 |
| 18" | 100' | 2,182 |
| 18" | 130' | 2,723 |
| 18" | 200' | 3,983 |
| 20" | 25' | 871 |
| 20" | 60' | 1,546 |
| 20" | 75' | 1 836 |
| 20" | 90' | 2,125 |
| 24" | 25' | 922 |
| 24" | 45' | 1,335 |
| 24" | 70' | 1,852 |
| 24" | 100' | 2,473 |
| 24" | 120' | 2,886 |
| 24" | 150' | 3,507 |
| 24" | 200' | 4,540 |
| 30" | 50' | 1,591 |
| 30" | 70' | 2,054 |
| 30" | 90' | 2,518 |
| 30" | 100' | 2,749 |
| 36" | 25' | 1,105 |
| 36" | 45' | 1,623 |
| 36" | 60' | 2,012 |
| 36" | 100' | 3,048 |

### TRUSS FRAME CONVEYORS

WRITE FOR BULLETIN #1188

| Add or Deduct Per Foot | Sale Price | Add or Deduct Per Five Feet |
|---|---|---|
| $16.62 | $ 965 | $109 |
| | 875 | |
| $17.10 | 1,434 | $112 |
| | 1,104 | |
| | 1,573 | |
| $18.03 | 2,159 | $117.20 |
| | 2,510 | |
| | 2,862 | |
| | 3,565 | |
| | 5,206 | |
| | 1 150 | |
| | 2,017 | |
| $19.30 | 2,388 | $123.81 |
| | 2,759 | |
| | 1,201 | |
| | 1,723 | |
| | 2,377 | |
| $20.68 | 3,160 | $130.66 |
| | 3,683 | |
| | 4,467 | |
| | 5,773 | |
| | 2,018 | |
| $23.17 | 2 594 | $144.18 |
| | 3,171 | |
| | 4,612 | |
| | 1,866 | |
| $25.91 | 2,024 | $157.64 |
| | 2,497 | |
| | 3,758 | |

## BONDED® HEAVY DUTY MOBILE CONVEYORS

- FAST ECONOMICAL HANDLING OF BULK MATERIAL
- AVAILABLE WITH SCREEN AND FEEDER
- RUGGED 30" DEEP TRUSS FRAME
- HIGH TONNAGE AT LOW COST
- EQUIPPED WITH TOW HITCH

The economical solution to the need for a heavy duty conveyor that can be readily moved from one job-site to another. Available with mast or mastless type undercarriage and hydraulic powered mechanism. All standard conveyor accessories can be used. Lengths to 60 feet and belt widths through 30 inches. **Priced from $2365.00**

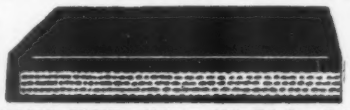
## TESTED CONVEYOR BELTING

**WE PAY FREIGHT ON 200 POUNDS OR OVER. AN ADDITIONAL 10% SAVINGS FROM SALE PRICE FOR FULL ROLLS 500 TO 650 FEET.**

**All belting is tested by the Engineering laboratory of one of the largest universities in the United States. It is guaranteed to meet or exceed listed specifications.**

Other widths, plies, duck weights and cover thickness available at low prices.

**WRITE FOR FREE SAMPLE & BULL. #1263**



**MAJOR BRAND: 12# to 15# Friction Pull. 800# to 1000# Cover Tensile.** Heavy Duty, 28 oz. duck. ⅛" top x 1/32" bottom rubber covers. Tough cotton duck, strong carcass and proper flexibility. Used in moving boxes, bags, coal, sand, gravel, crushed stone, salt, earth and similar materials.

| Width | Ply | U.S. Made Per Foot |
|---|---|---|
| 14" | 4 | $2.94 |
| 16" | 4 | 3.09 |
| 18" | 4 | 3.42 |
| 20" | 4 | 3.95 |
| 24" | 4 | 4.43 |
| 30" | 4 | 5.42 |
| 36" | 4 | 6.43 |

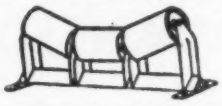
**MAJOR BEE BRAND: 16# to 19# Friction Pull. 2400# to 3000# Cover Tensile. Skim Coat Between Plies.** A high grade of heavy duty 28 oz. duck, ⅛" top x 1/32" bottom rubber covers. For severe service and abrasion resistance. For stone, mineral ores, concrete, cement and coal.

| Width | Ply | U.S. Made Belt Per Foot | Special Imported Belt Per Foot |
|---|---|---|---|
| 16" | 4 | $3.60 | $3.23 |
| 18" | 4 | 3.98 | 3.59 |
| 20" | 4 | 4.54 | 4.15 |
| 24" | 4 | 5.14 | 4.67 |
| 30" | 4 | 6.31 | 5.75 |
| 24" | 5 | 6.01 | 5.41 |

**WRITE US FOR YOUR ELEVATOR BELT AND CHUTE LINING REQUIREMENTS**

**ELEVATOR BELT** is of heavy duck carcass with smooth tough rubber or friction surface on one or both sides. Can be furnished with or without bucket holes punched and cemented. Write for full information and prices. **CHUTE LINING** is of high-tensile, abrasion-resisting quality. Recommended for Chute and Launder Lining, Conveyor Belt Scrapers, Conveyor Skirt Boards, Die-Press or Bumper Stock, Hoppers, Bins and other metal surfaces exposed to the action of abrasion materials.

## BONDED® IDLERS & RETURN ROLLS



3-roll, 5" diameter Troughing Idlers for:

| | | | |
|---|---|---|---|
| 14" belt | $19.75 | 24" belt | $22.75 |
| 16" belt | 20.50 | 30" belt | 23.85 |
| 18" belt | 21.90 | 36" belt | 24.90 |
| 20" belt | 22.10 | 48" belt | 27.50 |

1-roll, 5" diameter Return Rolls for:

| | | | |
|---|---|---|---|
| 14" belt | $ 8.50 | 24" belt | $11.00 |
| 16" belt | 9.00 | 30" belt | 12.50 |
| 18" belt | 9.50 | 36" belt | 13.75 |
| 20" belt | 10.00 | 48" belt | 16.50 |

All steel. Interchangeable with other well-known makes. Furnished with replaceable prelubricated sealed ball bearings. Maintenance is negligible. **WRITE FOR BULLETIN #1138.**

# BONDED SCALE AND MACHINE COMPANY

PHONE Days: Hickory 4-2186 — WRITE FOR FREE CATALOG AND PRICES — PHONE Evenings: AX. 1-2213 or TEmple 7-4519

110 BELLEVUE — Mfrs. of Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers, Feeders and Bucket Elevators — COLUMBUS 7, OHIO

## FOR SALE

102 KW, Murphy Diesel, 127/220/440/3/60/-1200 rpm, skid mounted, radiator cooled. Ready to roll ..... $5,250.00

65 KW Cat Diesel, 120/240 V, 1 phase, 900 rpm, D-13000 engine, good running condition ..... $3,750.00

60 KW G.M. 671, w/115/230V DC generator. Surplus, unused, skid mounted, radiator cooled ..... $3,950.00

30 KW, Delco Continental 400 cy. power units, gasoline 127/220 or 440V, 3 phase, 1714 rpm, housed, radiator cooled, w/elaborate control panel. As is, running $650 each. R & G ..... $1,450.00 ea.

New G.M. 671 oil cooler cores. $17.50 each.

New Fulton Sylphon high temp. and low oil pressure cutouts. Will work on gas or diesel ..... $67.50 ea.

New Buda 844 Liners ..... $40.00 set of 8.

350 Aluminum fuel drums, 10 gal. net weight 13#. Army surplus rocket fuel containers. High tensile strength. 18" dia., 12" high. Self-stacking. Use for fuel, oil, air, flotation ..... $6.50 each; $60.00 dozen.

14 New Wisconsin cyl. blocks, w/valves, #AA85SS for VE4, also 2 cyl. air cooled engine ..... $17.50 ea.

8 New Crankshafts for VE or VF Wisc. engs. w/Roller bearings. Part #CA55-11-S1 ..... $35.00 ea.

30 New Moline pancake oil coolers. Front of radiator mount, 28" by 28" by 1" thick. Part #AD1613 RO48. Make that engine run cooler ..... $17.50 ea.

**Midwest Diesel Power, Inc.**

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All Phones AVenue 3-3308

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1—New York Iron Works 2500 Lb. batch type asphalt plant, with three compartment hot bin and two compartment cold bin. Symons 4' x 10' enclosed screen. Complete dust collecting system with Ducon washer, cold elevator, 4½' x 20' Dryer. Starr weigh bucket for asphalt and Fairbanks 5000 Lb. dial scale for aggregate. The plant is complete with asphalt pump and piping, now operating at New Martinsville, West Virginia. Price loaded cars at that point $20,000.00.

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*Now You Can Afford To Do It*

*RELINE Chutes, Buckets, Trucks, etc*

**NICKEL MANGANESE PLATE**

3½% NICKEL . . . 11% to 13% MANGANESE

¼" x 42" x 96" ½" x 48" x 84"

⅜" x 48" x 84" ⅝" x 48" x 84"

$.33 per lb.

**10% Discount on 10,000 lb. or More**

(combined sizes can be used for discount)

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BAldwin 8-2422

5052 GAINOR ROAD PHILADELPHIA 31, PA.

## LIQUIDATING

1—Allis Chalmers 88 rotary dryer, 6'x50', complete

2—Louisville 88 rotary dryers, 8'x50', complete

1—Louisville rotary steam tube dryer, 8'x45'.

6—Rotary dryers, 2 tires, ⅛" shell, complete, 7'x60' 6'x64', 6'x56', 6'x50', 6'x35', 4'x20'.

10—Pacific vert. feed reciprocating pumps. 10 to 340 GPM, complete with motors

1—Durr DSFR-2 Classifier, 3'x20'6"x2½" slope

1—Hardinge pilot size ball mill, 24"x8" complete.

1—Patterson rod mill, 4'x11'6"

1—Steel batch type ball mill, 8'x8' with steel balls and 50 hp motor.

**R. GELB & SONS, Inc.**

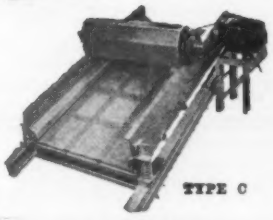
U. S. Highway No. 22 Union, N. J.

# BONDED EQUIPMENT BARGAINS

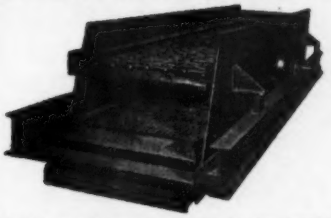
***WRITE, WIRE OR PHONE FOR FREE CATALOG AND PRICES***

**CURRENT MODELS - IMMEDIATE SHIPMENT FROM OUR FACTORY**

### SPECIAL SERVICE & HEAVY DUTY VIBRATING SCREENS



TYPE C



**WRITE FOR BULLETIN #1224**

For scalping middle-range pieces and accurate sizing of fines but where quantity and feed do not warrant a larger capacity, heavy duty model. Medium to heavy construction. Can also be suspended from four steel cables and springs for portable or temporary installation. Vibration remains in working screen body. No shaking of tipple, building or platform.

**Priced from $487**

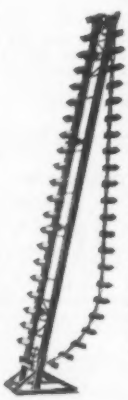
**WRITE FOR "SEVEN SECRETS OF SUCCESSFUL SCREENING" IN BULL. 1086.**

**FACTORY BALANCED CONTROLLED VIBRATION.** Two and four bearing positive throw electric shaft; 3' x 6' to 5' x 14', 1 to 5 decks. **WRITE FOR BULLETIN NO. 1087—"9 REASONS WHY BONDED IS OUR BEST BUY."**

For high tonnages, heavy scalping and multiple sizing of such minerals and industrial products as handled by above models. No dead spots. Springless live-rubber mounting of screen body controls vibration. Screen cloth and plate in all models reversible for longer life. Their finished edges prevent plates from splitting and cloth from ravelling.

**Priced from $1243**

### BONDED ® QUALITY BUILT BUCKET ELEVATORS



Bonded manufactures a complete line of both open and enclosed Bucket Elevators with the spaced type centrifugal discharge or the continuous type buckets mounted on chain or belt.

These Bonded elevators are designed to cover practically every need in elevating loose bulk materials. There are 38 models from which to choose.

The centrifugal type is used to handle bulk materials which can be picked up by the spaced buckets as they pass under the foot terminal and discharged by centrifugal force as the buckets pass over the head terminal.

The continuous type elevator may be used to handle the same kinds of material as the centrifugal type; however, they are recommended especially for handling materials that are difficult to pick up in a boot, or friable materials, due to the manner in which they are fed to and discharged by the elevator.

The open type elevators can be vertical or inclined, while the enclosed models must be vertical.

Selection of a standard elevator insures lower cost and more prompt delivery as it is made up of standard parts. Bonded also has a complete line of component parts and accessories available for building your own bucket elevator.

**WRITE FOR BULLETIN #1203 AND COMPLETE PRICES.**

### BONDED CONVEYOR PARTS

**Write For Bulletin #1138**

Screw Takeup and Frame

**$37.25**

Self Aligning Return Roll

**$49.25**

Holdback

**$99.00**

Gravity Takeup

**$413.00**

Head and Tail Section

**$149.00**

Carrying Belt Guide Idler

**$29.00 Per Pair**

Return Belt Guide Idler

**$15.50 Per Pair**

### BONDED ® FP SERIES PLATE FEEDERS

**WRITE FOR BULLETIN #1211**

**BONDED FP SERIES PLATE FEEDERS.** For use under bins; for controlling feed to picking tables, and for regulating material flow to screens, crushers, grinders and conveyors. Can be operated from conveyor drive. With or without hoppers and stands.

**PRICED FROM $455**

Self Aligning Idler

**$60.75**

Rubber Disc Impact Idler

**$69.75**

Wing Pulley

**$39.00**

## BONDED SCALE AND MACHINE COMPANY

**Mfrs. of Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders**

**110 BELLEVUE, COLUMBUS 7, OHIO** **Phones: HI 4-2186; AX 1-2213 Evenings**

## MAKE MONEY
## BUY THIS EQUIPMENT

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Telsmith 2536 Primary Crushing Plant.
Cedarapids 4633 Hammermill Secondary Unit.
Pioneer 305W Washing & Screening Plant.
2—Cedarapids 4033 Hammermills. Rebuilt.
Cedarapids 3033 Hammermill. Remanufactured.
Cedarapids 2033 Hammermill. Rebuilt.
Kennedy 37½ Gearless Gyratory.
Cedarapids 16' open inclined bucket elevator.
Aggregates 4' x 14', 3-deck inclined screen.
Telsmith 54H, 4' x 12', 3-Deck Screen.
Telsmith 22P, 4' x 12', 3-Deck Screen.
Cedarapids 5' x 12', 2-Deck Inclined Screen.
54" dia. x 23' lg. revolving screen.
2—Syntron F-44 Vibratory Feeders.
Cedarapids 30-S, 3-comp. charging hopper. New.
Smithco 10-yd. portable charging bin.
8'x12', 8'x18', 13'x28' bins in stock.
Eagle 10' x 24' scalping tank.
18", 24", 30", 36" conveyors & belting.
Smithco 30"x34', 7½ H.P. belt conveyor.

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Lorain L-50K, 1-yd. diesel shovel.
Lorain L-26, ¾-yd. diesel backhoe.
Link-Belt LS-71, ¾-yd. gas clam-crane.
Osgood 200, ½-yd. gas clam-crane.
Insley K-12, ½-yd. gas backhoe.
2—Lorain TL-20, ½-yd. gas shovel or hoe.
Lorain TL-20J, gas backhoe.
Bucyrus-Erie 10B, ¾-yd. gas shovel.
Lorain MC-530W, 35-Ton Moto-Crane.
Lorain MC-414, 20-ton Moto-Crane. Reconditioned.
Link-Belt HC-90, 25-ton truck crane.
Michigan TLDT-20, 10-ton truck crane.
Lorain MC-254, 15-ton moto-crane.
Lorain TL-20, 10-ton moto-crane.
Lorain TL-20-MC, moto-crane.
Lorain SP-107, 7-Ton Self-Propelled Crane.

### TRUCKS, TRACTORS, SCRAPERS

30-Euclid 66TD, 27-ton rear dumps.
6—Euclid 65TD, 27-ton rear dumps.
2—Euclid 13-yd. bottom dumps. Good.
1—Euclid tractor with 3200 gallon water tank.
1—Caterpillar D-8 with push block.
1—Caterpillar D-7 with cable bulldozer.
1—Caterpillar D-7 with hydraulic angledozer.
1—Caterpillar D-6 with hydraulic bulldozer.
1—Caterpillar D-6 with hydraulic angledozer.
1—Caterpillar HT-4, 1¾-yd. Traxcavator.
1—Caterpillar D-4 tractor only.
1—International TD-24, with cable angledozer.
1—International TD-14, 2¼-yd. front end loader.
1—Letourneau Super C Tournadozer. Excellent.
1—Allis-Chalmers HD9-G tractor with loader.
2—Euclid TC-12, twin engine tractors.
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4—International 2T75, 15-yd. scrapers.
2—Allis-Chalmers TS-360, 15-yd. scrapers.
1—Euclid TS-24, 24-yd. twin engine scraper.
1—Euclid 15½-yd. six wheel scraper.
5—Euclid 7-yd. overhung engine scrapers.
Inquire for list of Drilling Equipment, Air Compressors, Diesel Power Units, Generators, Shovels & Backhoe Attachments.
1—Adams 412H, Diesel Grader. Reconditioned.

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**Camp Hill, Pa.**
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All sizes, new and rebuilt. Starters, accessories, pulleys and repair parts. Gear motors. Falk Shaft mounted Speed Reducers, couplings and V-belt drives.

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5 Easton V-Shape, 36 in. ga. steel 2-way side dump cars.
$145. each. Branford, Conn.
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## WANTED

Model "C" Electric Tournapulls
1—HD 20 or 21 Push Cat or equal w/torque

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## 51-B SHOVEL FRONT
## UNUSED

2 Yd Dipper

**POWER SHOVEL CO.**
**Indianapolis 18, Ind.**

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FOR SALE: S&H MODEL 30 GASOLINE POWERED CORE DRILL ON 1959 DODGE W300M POWER WAGON. LESS THAN 100 HOURS TOTAL TIME. ACCESSORY LIST, PRICE AND DELIVERY ON REQUEST TO PURCHASING AGENT, FLORIDA TILE INDUSTRIES, INC., P.O. BOX 451, LAKELAND, FLORIDA.

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Wanted: One Rotary Screen, approximately 6' x 20' for washing sand and gravel. Bognar & Co., 2306 1st. Nat'l. Bank Bldg., Pgh. 22, Pa.

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## INSLEY GUY DERRICK

Rated Cap.—6 Ton

| | | |
|---|---|---|
| Mast | — 95' | 2 Sections — 32' — 6" |
| | | 1 Section — 30' — 0" |
| Boom | — 80' | 2 Sections — 30' — 0" |
| | | 1 Section — 20' — 0" |

Powered by 3 drum electric Hoisting Engine, also has power swingers.

**Priced for IMMEDIATE sale.**

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SPECIAL: Terratrac Model G300 with backhoe and trailer

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| American car puller | 4x10 Telsmith d.d. screen | Bay City #25 ⅛ yd. dragline |
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This equipment rebuilt in our modern plant by expert mechanics. Come see it!

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SPECIALS: 6-K-G Briquette PRESSES. 8' Raymond dbl. Whizzer & Dings 20x30" Electro Magnetic Separators.
PLANTS: CR 2236 Jaw, w/3' Cone, Pioneer 24V & 305W, 2036 Univ. Port. Blaw Knox BATCH. 2020 Impeller Breaker outfit.
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Sauerman HOISTS; also 300 & 500 HP sgl. drum
SHOVELS: NW25, 6, 80D. Link Belt LS50. Lima 34, 604, 1201. Manitowoc 4500. Lorain 820. Marion 93M, 111M. BW38B, 54B, 170B.
Feeders: 3x8, 3x15, Apron & 5x15 Pioneer Oro.

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| HP | Make | Type | Speed |
|---|---|---|---|
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| 300 | Cont. B.B. Splash | N-804 | 900 |
| 200 | Cont. T.E.F.C.B.B. | NF-743X | 1200 |
| 150 | West T.E.F.C.B.B. | CS-775C | 1200 |
| 150 | G.E. B.B. Open | KT-557 | 1200 |
| 150 | Cont. T.E.F.C.B.B. | NF-743X | 900 |
| 150 | Al. Chal. B.B. Open | AR-826 | 900 |
| 125 | Reliance B.B. Open | AA-504 | 3600 |
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Model WD 60 G.M.C. Diesels 6 Yd. Bodies. Bought New in 1955. Used three seasons at Asphalt Plant. Extra Good Condition. $3250 each.

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3—10'x78' Dryers—2'3'4'5½'7' Symons and Telsmith Cone Crushers—3648-4042-4872 Jaw Crushers and smaller sizes—48" & 20" Gyratory Vibrating Feeders—other types of Feeders—Eagle Fine & Coarse Material Washers—Dixie Non Clog moving plate Hammermills—Asphalt Plants—Jaw—Cone—Gyratory—Roll Double and Triple—Hammermill and Impact Crushers—Ball—Rod—Tube Mills—Screening, Washing and Crushing Plants, Classifiers, Compressors, Conveyors, Cranes, Drills, Dump Cars, Dredges, Feeders, Hoists, Motors, Generators, Kilns, Dryers, Locomotives, Pumps, Screens, Shovels, Draglines, Transformers, Euclid Trucks.

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***Priced For Quick Disposal***

3 Allis Chalmers (2 compartment) 7'x22' Compeb Mills with Meehanite liners; each directly coupled to 400 H.P. motor.

1 Allis Chalmers 9'6" Continuous Ball Mill; or PRELIMINATOR with Meehanite liner; directly coupled to 400 H.P. motor.

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3 Raymond 14' Mechanical Air Separators with Double Whizzer. Each Separator V-Belted to a 75 H.P. motor.

All Mills and Classifiers were operated in CLOSED CIRCUIT.

Also available are Steel Enclosed Bucket Elevators and Screw Conveyors.

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**One (1) Joy TM500 Self propelled pneumatic carriage quarry drill complete with Dust Collector. Immaculate condition. Inspection invited. Practically new. F.O.B., North Hackensack, N. J. .....$8,035.00**

***Also many other fine pieces of used air equipment, Compressors, Drills etc.***

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100—70 ton cap. Covered Hopper Cars
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JAEGER, 2 Drum, Gas. Engine, Ball Brg., Hydraulic Clutches and Brakes, 2 Speed, 12000 lbs. S.L.P. Also MUNDY, 2 Drum less 80 H.P. elec. Motor now mounted.

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40/50 TON AMERICAN #508 DIESEL LOCO. CRANE. NEW 1942.

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70 TON GEN. ELEC. 600 HP DIESEL LOCO.

45 TON GEN. ELEC. DIESEL ELEC. LOCOS.

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1 YD. LORAIN L-50 CRANE. NEW 1951.

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1905 Railway Exchange Bldg., St. Louis 1, Mo.

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46" Stedman 2 Cage
4 Row Disintegrator
Pulverizing Mill

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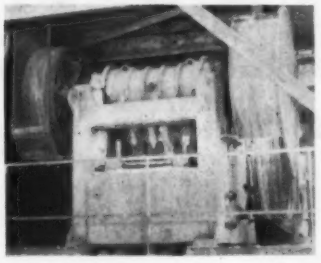

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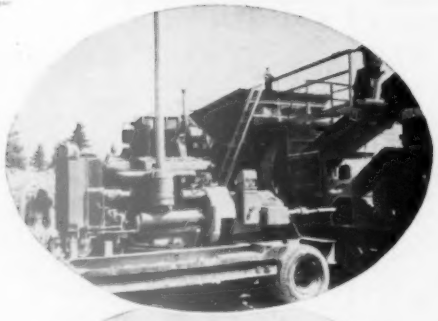

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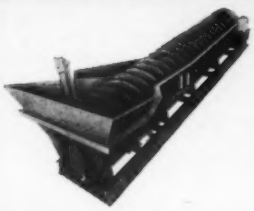

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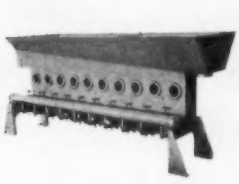
*SAND-SORT*

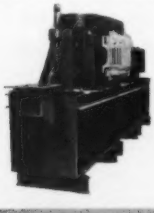
Free-settling classifying tank for separating sands into desired grades and sizes, removing large volumes of excess water, blending sand to varied specifications, with new automatic controls. Features individually controllable valve discharge . . . automatic valve closure in case of power failure or shutdown . . .



WEMCO

*SAND-SIZER*

Accurate sizing of sand into multiple fractions, and blending, for specification sand. Simple operation with maximum flexibility and control of each cell or compartment.



WEMCO

*SAND-SCRUBBER*

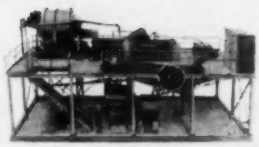
For economical scouring of sands, scrubbing off of coatings, breaking up of conglomerants. Opposed propeller blade action produces maximum scrubbing action with minimum contact time.

## AGGREGATE BENEFICIATION

WEMCO

*HMS MOBIL-MILL*

The only proved "packaged" HMS plant, pre-engineered, ready for set-up and operation. Removes wide range of deleterious material, produces large volume specification aggregate at low cost, minimum labor.



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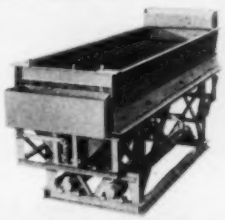
*REMER JIG*

For cleaning large tonnages of sand and gravel, production of specification aggregate . . . removes lightweight deleterious materials. Differential acceleration with long, wide bed gives faster, more active segregation over larger area.

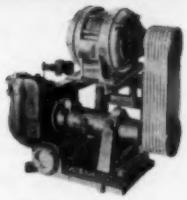


## PUMPING—SAND and GRAVEL

WEMCO

*SAND PUMP (HORIZONTAL)*

Universally in use for transfer of slurries containing sands and abrasive solids, screen products and grinding mill discharge to washers, scrubbers, sizers, or sand preparation machines. Simple operation. Minimum wear and labor requirements.



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*SAND PUMP (VERTICAL)*

Performance of horizontal Sand Pump with added vertical features. Widely used for clean-up duty installed over sump without need for separate pump pit.

WEMCO

*TORQUE-FLOW PUMP*

Unique Torque-Flow principle, open impeller, allows pumping of anything in a slurry which will enter throat. Handles solids with little wear at steady discharge pressures. Clogging by solids is eliminated.

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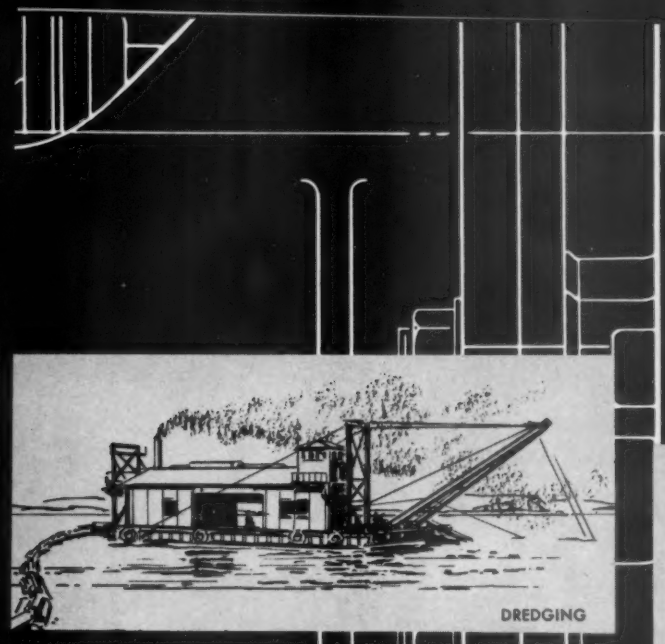


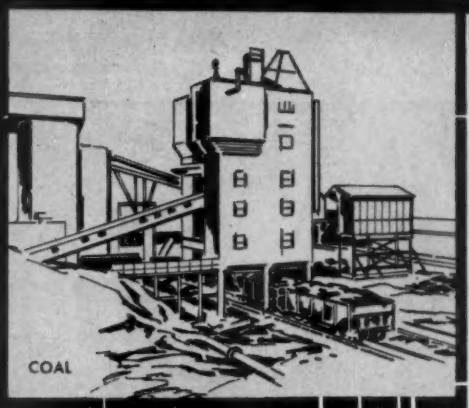

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## Wherever Sustained Pumping Performance is the Key to Economy

**Type CK Solids Pump.** A heavy duty, low speed solids pump with extra wide clearance, designed especially to handle fluids containing random size solids and heavily abrasive materials.

If you are pumping solids at any consistency that is fluid, there is a Morris Pump that will do the job dependably and economically.

Because they are often located in inaccessible areas where service needs must be few and far between, Morris pumps are designed to operate at highest efficiency, *constantly*. Morris pump reliability is based on quality features developed during 95 years of hydraulic design and testing experience.

Field testing has evolved the most exacting engineering of component parts . . . the correct selection, forming and machining of just the right alloys for each application . . . and pumps that are rugged, long-wearing and trouble free. Every part of every Morris Pump is accessible for fast, routine service—holding preventive maintenance to a minimum.

Let the qualified Morris Representative in your area help you select the right Pump for your job. Representatives in principal cities or write direct.

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**Baldwinsville, N.Y.**

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Why Extra Production Capacity? Because Universal Impact Master's *straight-line flow* eliminates bottle necks, rebounding and congestion.

Rock, falling into the breaking chamber is shattered by the hammers and hurled forward through the upper screen grate. Oversize, falling into the second rotor hammers, is reduced to size and discharged. The rock always moves in a straight-line flow because the hammers turn in the same direction. All finished material is immediately removed from the breaking chamber.

Less power is required to get this high production. You get more tons per hour at a lower cost. And the highly cubicle finished product meets today's rigid specs. Gradation is controlled by simple adjustments.

Enjoy the *extra* dollar and cents benefits of Impact Master's Straight-line Flow. Just contact your Universal distributor for complete information.

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VICTOR

for hardfacing **NI-MN RODS** *for build-up* *for attachment*

**Victor Ni-Manganese for Build-up** is 4½% nickel, 13% manganese alloy, specifically developed for rebuilding manganese steel parts such as bucket teeth and lips; rail frogs and switches; crusher, dredge, pulverizer components. May be used as finish build-up or underbase; forms sound, slag-free welds; high deposition rate and good weldability. Deposits are austenitic with full Hadfield steel properties; nonmagnetic, tough and ductile; stands roughest abuse. Made in 5/32", 3/16" and 1/4" diameters; bare, for manual application by DC, reverse polarity.

**Victor Ni-Manganese for Attachment** welds crack-free, is specially recommended for difficult joining applications on manganese or carbon steel castings, such as: Dipper teeth and lips; track and drive sprockets; dragline pins and links; rail crossovers, switches and frogs; rolling mill parts; crusher screens, hammers, rolls and mantles; dredge parts. Deposited metal is extremely tough, wears well, has high impact strength. It's a wonderful, low-cost substitute for "stainless" where joining rather than corrosion resistance is chief factor. Made in 1/8", 5/32", 3/16" and 1/4" diameters for manual application by AC or DC, reverse polarity.

For all your hardfacing or welding needs, call your Victor dealer. Order Victor Ni-Mn rods today.

*Profitable dealerships open; inquire now!*

**VICTOR EQUIPMENT COMPANY** *Alloy Rod & Metal Division* H-65

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# VERSATILE SIMPLE AUTOMATIC

## DRY SOLIDS CONVEYING

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| Cement | Petroleum Coke | Dolomite |
| Carbon Black | Pulverized Coal | Pharmaceuticals |
| Fertilizers | Fly Ash | Sand |
| Hydrated Lime | Fullers Earth | Fire Clay |
| Lump Lime | Soda Ash | Flour |

Powdered and Granular Dry Chemicals

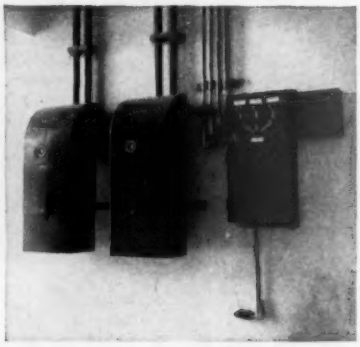
Dry cement arrives at the plant by truck in KENNEDY Air Activated Containers. It is transferred directly by air pressure to this storage silo at 10 tons per hour through a 2½" pipe.

**THE KENNEDY PNEUMATIC CONVEYING SYSTEM HANDLES THESE AND MANY OTHER PRODUCTS WITH *EASE* AND *ECONOMY***

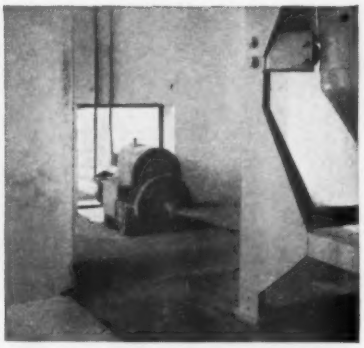
Eternit Colombiana S. A. looked for simplicity plus completely automatic operation for the dry cement handling system of their new asbestos-cement pipe and sheet plant at Bogota, Colombia.

The KENNEDY Pneumatic Conveying System met—*and exceeded*—every exacting requirement.

A KENNEDY Pneumatic Pump is located immediately below the main silo. Batch transfer to intermediate bins is accomplished without screws or other rotating parts. Batch sequence is entirely automatic.



A low level control transmits a signal to this center as the level drops in any of three intermediate bins. All controls for the complete system are in the small right hand box; the two starters are for air compressors.



When actuated by the control center, this 3-way distribution valve opens the 2½" pipeline to the proper bin; the Pneumatic Pump then transfers a 1,000 pound batch of cement from the main silo.

Below each of the intermediate bins is a mixing station which correctly proportions the ingredients for the exact product composition desired. From delivery to finished mix—every operation is simply, automatically controlled.

This simplicity, versatility and dependability is characteristic of the KENNEDY Pneumatic Conveying System. Low maintenance is assured because there are no motors, screws or other major wearing parts exposed to the moving material.

Investigate this proven system for your materials handling problems.

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*Studies in Centralized Lubrication*
No. 200

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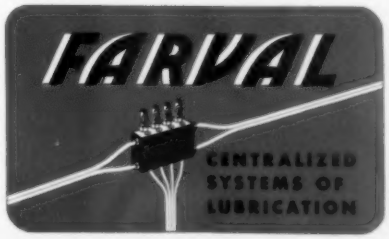
**Proved in 30 years of service, Farval manual and automatic centralized lubrication systems protect bearings of thousands of machines in industry. Wherever you see the familiar Dualine valve manifolds, dual lubricant lines and central pumping station, you know a machine is being properly lubricated.**

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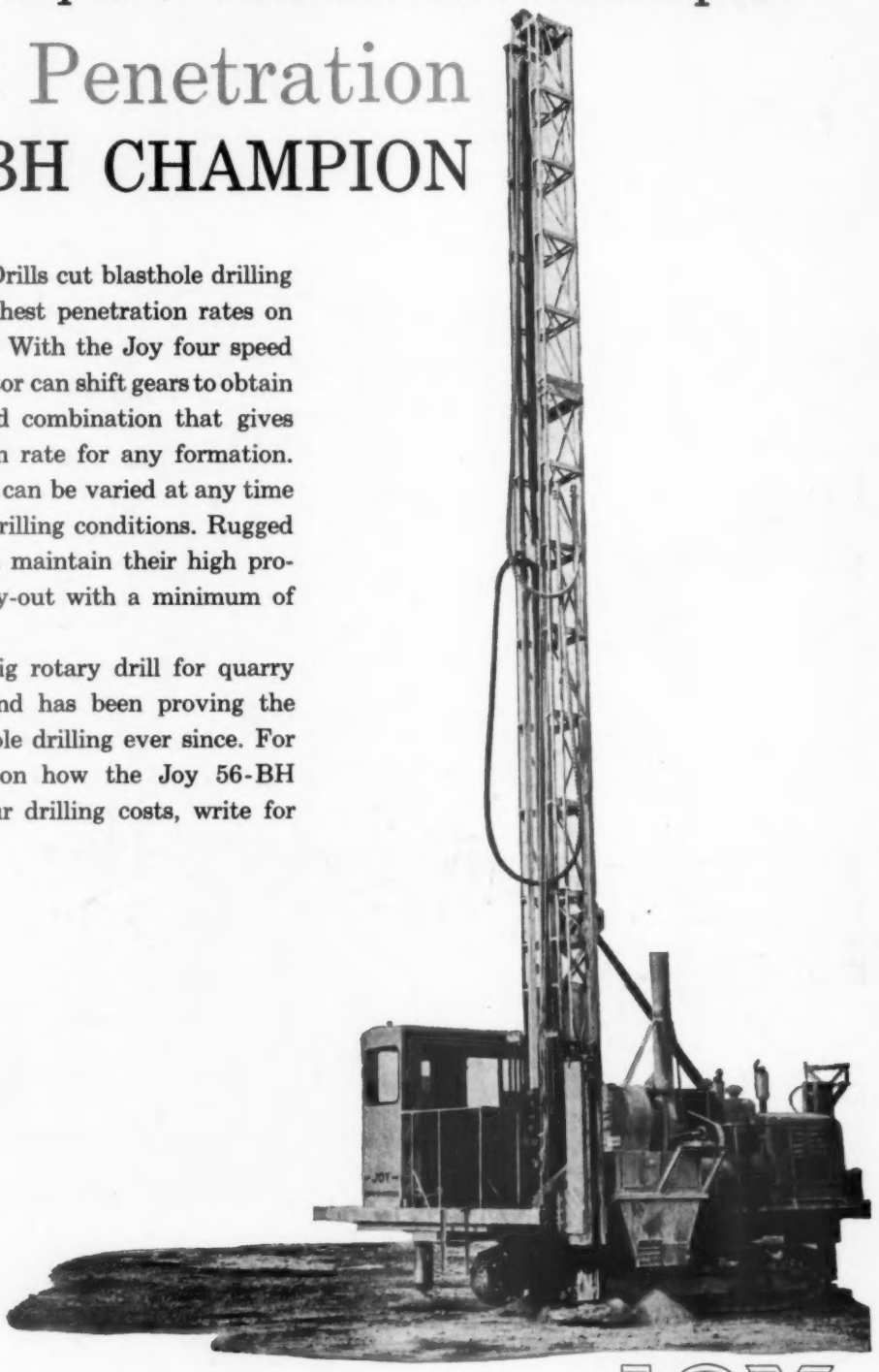
# Variable Torque + Variable Rotation Speed =

# Fastest Penetration

# JOY 56-BH CHAMPION

Joy 56-BH Champion Drills cut blasthole drilling costs by giving the highest penetration rates on blast holes up to 6¾". With the Joy four speed transmission, the operator can shift gears to obtain a torque-rotation speed combination that gives the highest penetration rate for any formation. The torque-speed ratio can be varied at any time to meet a change in drilling conditions. Rugged 56-BH Champions can maintain their high production day-in and day-out with a minimum of maintenance.

Joy pioneered the big rotary drill for quarry operations in 1946, and has been proving the economy of big blasthole drilling ever since. For complete information on how the Joy 56-BH Champion can cut your drilling costs, write for Bulletin 2461-26.



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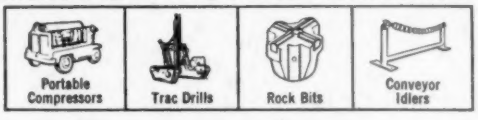


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